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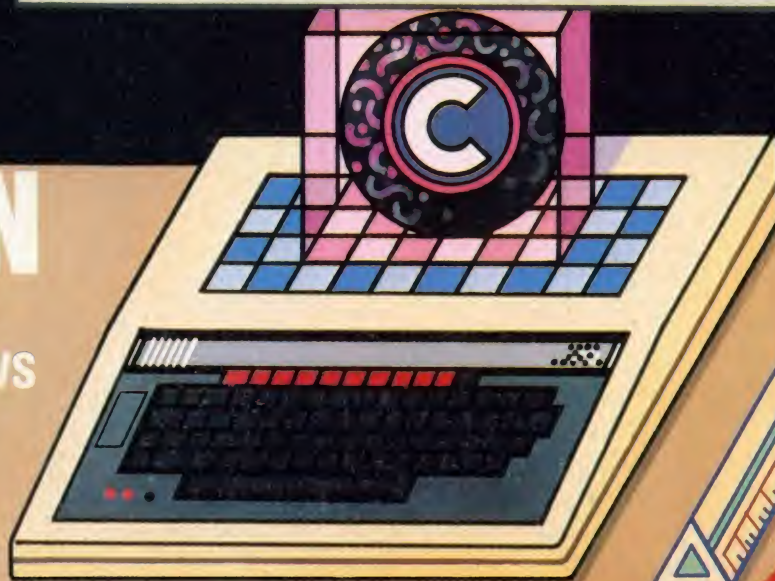


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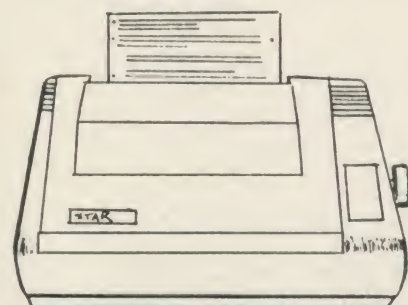
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ATOM

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YELLOW PAGES

The major listings for this issue are printed in the yellow section starting on page 97. These are also available on cassette (which includes a tape-to-disc transfer routine and index program) and in bar code format to save you typing them in. For details of how to order these, see pages 96 and 103

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Micronet members look out for free Acorn User programs. See page 75 for a great competition

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Editorial assistant *Kitty Milne* Art assistant *Simon Carter* Publishing director
Michael Potter Editorial director *Christopher Ward* Editorial Redwood Publishing Ltd, 68 Long Acre, London WC2E 9JH. Tel: 01-836 2441. **Advertising** Simon Goode, Advertising manager, Computer Marketplace Ltd, 20 Orange St, London WC2H 7ED. Tel: 01-930 1612. **Subscriptions** Kate Evans, Subscription manager, Redwood Publishing, 68 Long Acre, London WC2E 9JH. Tel: 01-836 2441. Rates: UK £15, Europe £25; Middle East, Americas, Africa £30; Rest of the world £35 (prices include p&p for 12 issues). Published by Redwood Publishing Ltd, 68 Long Acre, London WC2E 9JH.

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EDUCATION SPECIAL

MAY



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EDUCATION

Software guide 141

If you're after programs for school or home, here's the information on where to go – 800 titles covered and classified with addresses

Logo software 65

Joe Telford checks up on four versions of this language on a chip

Valiant Turtle offer 79

Save up to £70 on an infra-red turtle and Logo language software

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Three ways to overcome the problems young fingers have with typing

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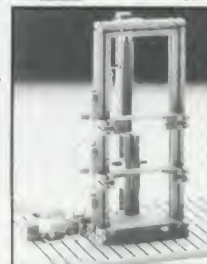
Acorn User
May 1985
Issue number 34

Cover illustration
by Peter Bentley

NEXT MONTH



ROBOT SPECIAL
What's around,
how they work
with your micro
and how to
use them

**Sideways RAM utilities**

First of three articles on using these boards

Scrolling noticeboard

Leave messages that move as you read them

Languages: Comal

Why is this language so popular in foreign schools?

View printer driver

Save yourself a fortune with this excellent program

Making music

The Music 500 put to the test by Ultravox

Notes for authors

Acorn User welcomes submissions from readers. Articles should be typed, double-spaced text with diagrams and screen dumps on separate sheets, or on disc in Wordwise (saved as a *SPOOL file using option 8) or Viewformat. Leave large margins to allow space for editing.

Please enclose all programs on disc or cassette, with listings if possible. Also follow the style used in presenting listings in the yellow pages section. Photos should be 35mm, or larger, transparencies, or 5in by 7in

black and white prints. Ensure your name is on everything, and keep a copy. Enclose a suitable stamped, addressed envelope if the submission is to be returned. Attach a short letter with the article giving its title with a daytime phone number if possible. Address your article to the Technical editor. Articles are acknowledged on receipt, but not submissions for the regular columns, letters pages and competitions. Please limit telephone enquiries to the Technical editor to Wednesday and Thursday afternoons.



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The Touch Pad is a low-cost graphic plotting aid for the BBC micro. This compact display cursor moving device simplifies programming with the touch of the stylus.

The product comes complete with an instruction booklet, basic software, stylus and connecting cable. Its uses are in graphics, computer aided design, education and games.

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safety by the D.M.E.E. and are extensively used in GLC and ILEA establishments. Cumana were the first independent disk drive supplier and are now Europe's market leader. Their products have been proven in the schools, universities and homes throughout Europe. Let us drive you the right direction, send now for further details of the Cumana range, or see them at our distributors and at selected branches of W.H. Smith, Lasky's, Greens, Currys, and Spectrum UK.



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A microcomputer with a proven track record. Using BBC Basic, the Electron was developed out of the Micro that has been chosen for over 80% of schools participating in the Government's current Micros In Schools project. It connects into almost any TV set and cassette player and is supplied with a comprehensive User Guide which runs through, in a simple to follow manner, the basic principles of programming. A wide range of software is available, including games, educational packages and home accounts.

Disk interface now available for the Acorn Electron, Spectrum and Spectrum + Dragon 32/64, details from Cumana. Electron Interface £149.95 inc. VAT.

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Electron discs

CUMANA has released a disc interface for the Electron running through the Plus 1 add-on. See page 9.

Adventure for beginners

LEVEL 9's graphic adventure *Emerald Isle* for the BBC has 230 locations, each with its own picture. At £6.95, it's cheaper than usual, but then the company says it's not quite so mind-boggling and better for beginners.

Eight new music discs

PERFORMER is a real-time recording package for users of the MIDI interface connecting electronic instruments to the BBC micro.

It is one of eight pieces of software for MIDI produced by Electromusic Research and sold in music shops. Prices range from £15 to £45 for each disc.

User port extra

A PLUG-IN board to provide two extra user ports through the 1MHz bus on the BBC is available for £30 from Hardworks, 1 The Corner, Horsey, Great Yarmouth NR29 4EH.

Mole on micros

MOSAIC is to release two computer games based on the Adrian Mole books in the autumn to coincide with a Thames TV series.

The games are being written by Level 9, who also did *Eric the Viking* for Mosaic.

Graphics mouse

GRAPHICS is the strength of a mouse package from SMC Supplies which comes with sprite and character designers as well as a full painting system.

The mouse costs £60 from SMC at 11 Western Parade, Great North Rd, Barnet EN5 1AD.

Phone-tapping Bill could hit hackers

by Bill Penfold

HACKERS who use their computers and modems to break into electronic databases could soon be faced with hefty fines and even jail.

Tough new legislation against illegal phone tapping has inadvertently given victims of hackers a way to hit back: until now they could only charge offenders with minor items such as stealing electricity.

Now up to two years in prison plus £2000 in penalties are in prospect for hackers – many of them teenagers – who use public telecommunication systems to break into private networks, computer mailboxes or computer communications. It will end the uncertainty in the present law and enable courts to hand out sentences to match the offence.

New powers

The new powers will be a spin-off of the Government's controversial Interception of Communications Bill now being piloted through the Commons by Home Secretary Leon Brittan. The main aim of the Bill is to enable the Home Office to authorise telephone tapping without breaking the European Convention of Human Rights. But it will also set out stringent penalties to prohibit other people from tapping the phone system – or



Home Secretary Brittan

illegally breaking into computer systems.

The Bill covers all public telecommunications systems, including links with abroad.

Concern over the activities of the hackers has risen rapidly over the last two years and came to the attention of the politicians last autumn with the headlines over the illegal break-in to Prince Philip's Prestel mailbox.

That incident grabbed public notoriety, but behind the scenes British Telecom and the Home Office had long been worried about the increasing number of hackers – some of whom regard it as merely a challenge, while others have more sinister intentions.

The Bill – with connotations of MI5 bugging CND and civil liberties organisations – is one of the most contentious pieces

of legislation currently going through the parliamentary pipeline. Apart from the activities of the security agencies, most of the attention has inevitably focused on the world of international espionage, subversion and big-time crime.

But the Home Office and British Telecom were well aware that the Bill will effectively provide a legal framework for cracking down on the hackers.

The prospect clearly pleases British Telecom whose spokesman explained: 'Anything which gives greater control over the activities of some of those hackers is to be welcomed. The position has often been rather difficult. In many cases the only thing you can get them for is "theft of electricity", which was not really very satisfactory. So the proposed legislation will be very useful.'

Grey area

Not all hacking, however, will be covered by the new legislation. It appears to be a grey area if you use the public telephone system to break into a private data bank. But anyone illegally logging into a Prestel or Telecom Gold mailbox will soon be able to find the full force of the law descending on them.

This is clearly stated in the first clause of the Bill which says it will be an offence to 'unlawfully intercept communications' while they are being passed on public telecommunications systems.

●PRESTEL has decided to get tough and make an example of the hackers who it believes broke into the Duke of Edinburgh's mailbox last year.

The police, apparently acting on a BT tip-off, swooped on two suspects who have been charged with forging devices for recording information on Prestel computers. One of these 'devices' was a computer disc. Both face up to 10 years in prison.

We're showing off again

THE 1985 Acorn User Exhibition will run from July 25 to 28 (Thursday to Sunday) at the Barbican Centre in London. With 25,000 people expected through the doors, and more than 100 exhibitors, it looks set to be another great show.

The entrance fee will be £2 for under-16s and £3 for adults, with a £1 discount on tickets ordered from the organisers in advance.

The exhibition will be based in the Barbican's Hall A, with

special sections devoted to communications, business, education and the home user.

Details from Acorn User Exhibition, 20 Orange St, London WC2H 7ED. Tel: 01-930 1612. Look out for the latest news in future editions of Acorn User.

●READERS who are Micronet members should look out for free listings to download by modem and news from Acorn User.



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The BBC Computer can run software packages stored on EPROM using the four 'SIDEWAYS ROM' sockets on its printed circuit board. Now that an ever increasing range of software packages for word processing, financial planning and other applications are available in this format there is a need to expand the facility and take advantage of these developments.

ATPL has designed SIDEWISE which provides you with a further twelve sockets giving a total capability of sixteen SIDEWAYS ROMs. The maximum number capable of being supported by the BBC computer operating system. In addition to the ROM expansion, one of the SIDEWAYS ROM sockets may be defined as RAM, permitting SIDEWAYS ROM software to be loaded into the RAM area of the machine using normal OS commands. Once loaded, the RAM may be used like any other SIDEWAYS ROM and the limitation of having only sixteen sockets is effectively removed.

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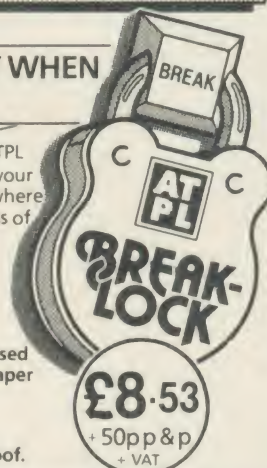
FOR THE BBC MICRO

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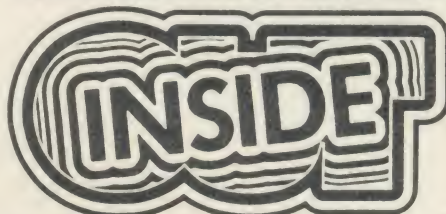
ATPL 'BREAK-LOCK' is a 2 position key-switch that will:

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- ☐ Render demonstration machines tamper-proof.



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INSIDEOUT is designed to make a sideways ROM socket available outside the BBC computer, to allow for easy exchange of sideways ROM's.



CAN BE USED FROM BBC MODEL B OR EXPANSION BOARD SOCKETS • SUPPLIED WITH LOW INSERTION FORCE SOCKET FOR EASE OF USE
NO COSTLY CARTRIDGE PACKING • EPROM PLUG IN AND GO • NOT LIMITED TO ONE DEVICE • SOCKET RATED AT 100'S OF INSERTIONS
MOUNTED OUTSIDE THE BBC. EASILY REMOVED AND REFITTED • CAN BE MOUNTED IN USER DEFINED LOCATION - NOT FITTING IN AN ILLEGAL POSITION

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Turns it into an 8K or 16K printer buffer
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Cheques made payable to Advanced Technology Products Ltd. please allow 28 days for delivery. Cost of carriage or postage refer to each section. Quantity orders and overseas carriage charged at cost. Condition of sales available on request.



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In accordance with our policy of progressive development, we reserve the right to modify specifications without prior notice

Telford's book

JOE Telford, well known to readers for his Jottings, has written a book, *BBC Micro Advanced Programming*, published by Prentice Hall at £9.95. With more than 100 programs in 392 pages, it's pretty comprehensive.

School saving

READERS who feel they may qualify for discounts under Acorn's Micros in Schools scheme should contact the company's education division for details of the nearest dealer taking part. The number is (0223) 245200.

Torch upgrade

TORCH has released an improved version of its Unix system known as the Unicorn 1024. The speed of the 68000 chip at the heart of the £3000 add-on has been raised and the RAM available increased to 1Mb.

Contact Torch at Abberley House, Great Shelford, Cambridge CB2 5LQ, tel: (0223) 841000.

Podd's a winner

PODD from ASK won the best educational software of the year title from the Computer Trade Association. The program aims to teach children aged five to ten about verbs, and is available for the BBC micro and Electron.

Micros for trade

THE London School of Foreign Trade has opened a software library at 61 Westminster Bridge Road, London SE1 7HT, tel: 01-928 6810.

Slomo change

SLOMO, the device to slow down software referred to in February's issue, is available from Nidd Valley Products and not Cambridge Computing Research as stated. For details contact Nidd on (0423) 864488.

TAB grows

A CLOSED user group for BBC micro users is being established on The Australian Beginning (TAB).

TAB has been operating since 1981, with a bulletin board, product and club news and electronic shopping.

Electron marches on

ACORN has committed itself to supporting the Electron until the end of 1986, and said that the machine will continue to be manufactured.

Alex Reid, the company's acting chairman, made these statements just before Acorn's shares were re-released on the stock exchange.

Electrons are still being supplied to British Telecom as

part of the Healthnet communications system. They are being made in small numbers while present stocks left over from Christmas are run down.

The first casualty of the slimmed-down Acorn is the customer services department which has been disbanded. The four new divisions covering consumer, education and training, scientific and indus-



Reid

Piol

trial, and training within the company are expected to look after their own customers, rather than everything going through one department as it has done for two years.

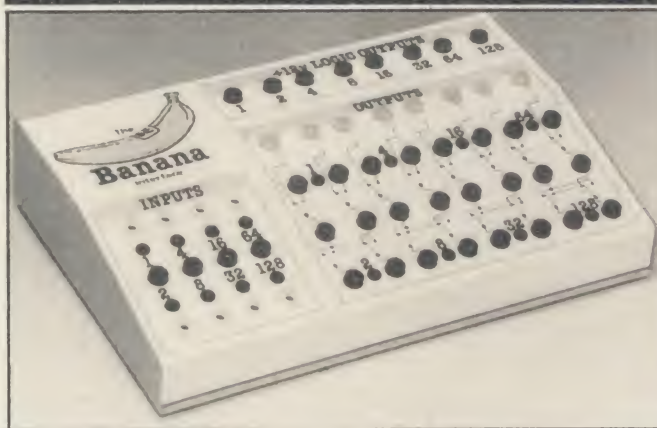
Anyone contacting Acorn is told to approach their local dealer, but even dealers aren't getting much information and are waiting to see what happens next.

Manufacture of BBC micros will be controlled by the education division, whose director was formerly head of production at Acorn.

On the ABC front, 54-year-old Elserino Piol of Olivetti who masterminded the Acorn deal has said in an interview with an Italian newspaper that there will be no overlap between products produced by the two companies.

Meanwhile, Acorn must be hoping that some of its products will be suitable for use by American communications giant AT&T. The company owns a quarter stake in Olivetti, and a deal between the two is largely held to be responsible for the Italians' profits leaping almost 70 per cent over last year.

Business news – page 127



Control hardware with a Banana

Plug in a Banana for control

MONKEYS who want to learn about control technology should get hold of a Banana Micro Interface, says Castle Associates, because it's so easy to use.

The Banana plugs into the user and printer ports of the BBC micro and its various output voltages can be controlled to drive motors, relays, etc. Protection circuitry inside the

metal case protects both the Banana and the micro. It costs £175 plus VAT.

Castle Associates aims to release hardware and software for experiments to add to the book of ideas provided. Contact the company at Salter Road, Cayton Low Road Industrial Estate, Scarborough YO11 3UZ. The number is (0723) 584250.

New software for teachers

MICROMATH is a new journal aimed at people using micros in education for teaching maths.

ATM, the Association of Teachers of Mathematics, has joined forces with publishers Basil Blackwell to produce *Micromath*, the first issue of which appears this month. For details contact Blackwell's at 108 Cowley Road, Oxford.

For English courses, Longmans has released a series of language games under the collective title *Quartext*. For £35 (plus VAT), the user

receives two 80-track discs – one containing the programs, the other ten sample texts.

Available separately for £30 is *Textloader* which is a sort of wordprocessor to create new passages of text for the games. Longman also produces discs at £12 each for teachers of English as a foreign language.

Six simulations from John Wiley cover map-reading, being stranded on desert islands, orienteering, sheep dog trials, a scavenger hunt and river rafting. They are

aimed at children aged seven to 13.

All are designed to develop specific skills relevant to each task and encourage general strategy planning with group discussion.

The programs are supplied on 40/80 track discs with teachers' and students' notes. They cost from £14.95 to £19.95.

Finally, the MUSE conference runs from July 29-31 and will be held at Nottingham University.



Barbican Centre,
London EC2.
25th-28th July 1985

STILL THE BIGGEST! STILL THE BEST!

Four days of non-stop entertainment and business.

If you're an Acorn owner, user or just thinking of buying a computer you shouldn't miss the Acorn User Exhibition. It's four days of fun, bargains, demonstrations and information.

There are specialist areas for business, education, telecommunications, robotics and home use. Each with special demonstrations, competitions, and brand new products. And there'll be experts to answer your technical questions.

All in all, we're expecting over 120 different companies to be there, as well as Acorn themselves.

And because the Exhibition is at the Barbican there's plenty of restaurants bars and rest areas.

So if you're a businessman, scientist, parent, teacher, computer fanatic or home user. **Don't miss the only OFFICIAL ACORN EXHIBITION.**

For information on stand availability
ring Tim Collins on 01-930 1612

P.S. Acorn have promised
some very special events
exclusive to the
show!



THE THIRD OFFICIAL ACORN USER EXHIBITION

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FOR GROUPS

Entry only £1 per person
for bookings over
10 people. Complete form below.

MISS THE QUEUES - SAVE MONEY!

Use the coupon below to save money and miss the queues.
Entrance at the door will be £3 for adults, £2 for under sixteens.

HOW TO GET THERE

By train: Holborn Viaduct, Cannon Street, Broad Street,
Kings Cross, St Pancras, Liverpool Street.
By Underground: Moorgate, Barbican, St Pauls, Bank, Liverpool St.

Computer Marketplace (Exhibitions) Ltd
(A Rushworth Dales Group Company)
20, Orange Street, London WC2H 7ED.

To: Computer Marketplace (Exhibitions) Ltd, 20 Orange St, London WC2H 7ED.

AUI

Please send _____ (Qty) Adult Tickets at £2 and
_____ (Qty) Under sixteen tickets at £1 each

I enclose cheque/P.O. for £_____ or debit my Access/Amex/
Diners card no. _____

Signature _____

Name _____

Address _____

Postcode _____

Schools network goes into colour

by Geoff Nairn

THE Times Network for Schools now carries pages of colour and high-resolution graphics. The communication network hooks up BBC micros in schools using the Telecom Gold electronic mail service, but until now it has been based on a black and white text-only screen.

The addition of colour pages using viewdata and hi-res graphics opens up the Network to far more educational applications. Also, it ensures the Network can compete visually with Prestel.

Possible applications of the new graphics pages include geography – there's a detailed

map of Britain on the system already – and colourful competitions. When such a page is read by a school's BBC micro, the network system software automatically switches the computer into graphics mode.

Although it was revealed in AU back in August 1984, the Times Network for Schools was only officially launched this April. However, every LEA in the country has subscribed to the Network and by the end of the month, over 2000 schools should be on-line. Derbyshire LEA has set up its own database within the Times Network, containing teachers' information and a children's gazetteer of Derbyshire.

Maths on disc and at Oxford

TEACHERS of maths in secondary schools can look forward to their own conference in July. 'Mathematics at 16+' will be held at St Peter's College in Oxford from July 22 to 24. The fees range from £45 for non-residents without meals to £65.

For full details, contact the conference secretary at 41a West St, Oundle, Peterborough PE8 4EJ.

The MEI project, which is behind the conference, has also produced a series of software to support teaching subjects such as graph plotting, statistics, numerical analysis and matrix algebra.

Each 40/80-track disc costs £17.50 and all are compatible with the 6502 second processor and Econet levels one and two. Contact MEI at the same address above.

Stock bulletin

TECHNOMATIC has launched its own phone-in information service using Prestel protocol.

The system will initially run in the evening and at weekends with information on products the company stocks, and details of ordering and availability. Techno-line hopes to expand to 24-hour coverage, and will run on 01-452 1500 at 1200/75 and 300/300 baud.

Tube software

TUBELINK, the Viewfax database for users of second processors, is carrying free software to convert discs from CP/M to the Torch CPN format.

Benjamin Rietti, the 14-year-old editor, claims it is the most popular service for BBC owners with articles on using the Tube, machine code and ROM software.

Prestel users can access Tubelink on page 258216.

Old games with new owners

QUICKSILVA has taken over the rights to seven games developed by Liverpool software house Bug Byte. This is the second such deal recently, with Ocean taking over

Imagine titles after the company folded.

Meanwhile, Incentive is to market its *Confuzion* game for the BBC micro and Electron at £6.95.



25 FREE TAPES

WIZADORE

Just clip the coupon below for the chance of a free copy of Wizadore, the new graphics adventure from Ocean Software for the BBC micro.

The first 25 coupons pulled out of the postbag at the Acorn User's Long Acre offices will receive a tape.

And that's not all: Ocean is offering £100 for each of the next five months to the first entry out of the hat which completes the adventure. Simply write the codeword given at the end of the game on the form from the cassette inlay card and send it off to Ocean. The name of the £100 winner each month will be printed in Acorn User. Full details are given with each tape.

Look in Acorn User to see if you've won

But first of all, take your chance to get a free game. Cut out the coupon below and send it to: Ocean Offer, Acorn User, 68 Long Acre, London WC2E 9JH.

If my coupon is one of the first 25 pulled out of the postbag at Acorn User, please send me a free copy of Wizadore, the graphics adventure from Ocean.

Name

Address

.....Post code.....

66 83 55 52 86 ? ? ? 5 54 36 35 52 82 87 36 51
What is the sum of the missing numbers?

AMX MOUSE

Catch an incredible AMX MOUSE! The advanced opto-mechanical device that brings to your BBC micro facilities once only available on more expensive computers. Now you can use ICONS, WINDOWS AND POINTERS in your own programs.

AMX PACKAGE

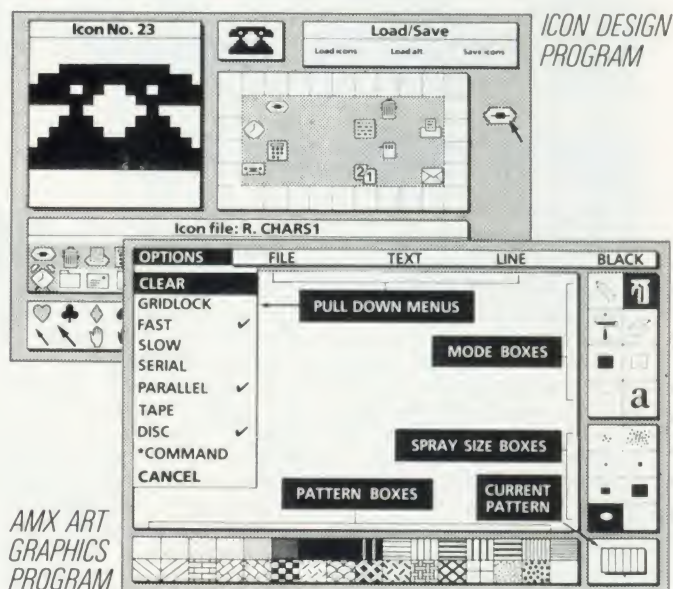
Plug the MOUSE into the user port, and the EPROM into your board. The latter contains fast machine code routines for creating on-screen windows, icons and pointers. And means that the MOUSE buttons can be programmed for use with commercial software such as Wordwise and View. There are two manuals included, explaining how to operate the MOUSE and the ROM routines, which are available in both basic and machine code programs.

Included in the package are two superb programs:

AMX ART has to be seen to be believed! It's a computer-aided drawing program that's just as good for serious applications—such as the preparation of detailed architectural and engineering drawings or teachers' worksheets—as it is for having lots of family fun! And if you're artistically inclined, you'll be astonished at the quality of work you can produce and save. It makes full use of on-screen menus, pull-down menus and icons: the ideal, easy way for novices to learn and gain in confidence.

ICON DESIGNER is an invaluable program for creating and storing icons for use in your OWN programs.

The AMX MOUSE may be used with any BBC Model B fitted with the Operating System 1.2; and it's compatible with the 6502 second processor and disc or tape filing systems.



AMX ART
GRAPHICS
PROGRAM

ICON DESIGN
PROGRAM

New! AMX DESK

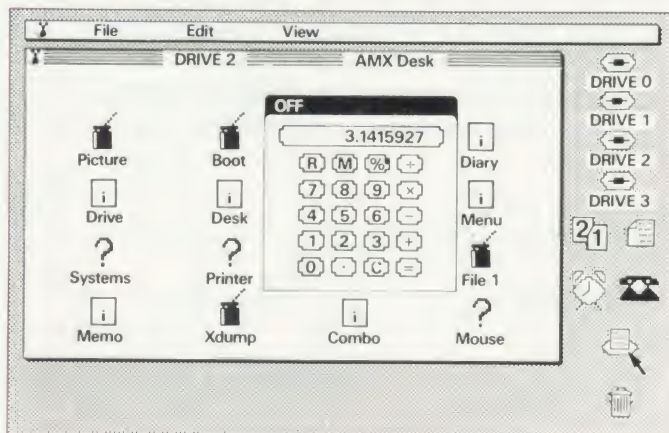
DISC ONLY
£24.95 INC VAT

A terrific new program designed for the AMX MOUSE. If you want to get properly organised—at home or at work—DESK is for you!

The main screen contains a desktop with header offering SYSTEM, FILE and EDIT menus—plus an additional menu for extra features; and there's a constant time display.

Down the right-hand side are icons displaying Disc Drives, Memo Pad, Telephone Book, Diary, Alarm Clock, Printer and Trash Can. Simply by using your MOUSE you can select any service you require.

- MEMO PAD—Up to three pages of text may be stored. With printing at the touch of a button.
- TELEPHONE/ADDRESS BOOK—Up to 200 or 400 entries (depending on disc drive capacity) with handy scrolling search.
- DIARY—Displays a calendar for three months, centred on the current month, with scrolling backwards and forwards. Dates with entries are highlighted; select a date and view the entries.
- ALARM—Sounds at the time you've pre-set, whichever DESK service you're using.
- CALCULATOR—A full-function calculator can be brought on-screen at any time, and results can be stored for use in Memo Pad, etc.



Any window showing Telephone/Address Book, Diary or Memo Pad may be dumped to the printer by simply selecting the printer icon.

An interface program for Wordwise+ and View means pictures created with AMX ART can be merged with text upon printing out.

New! AMX UTILITIES

DISC ONLY
£14.95 INC VAT

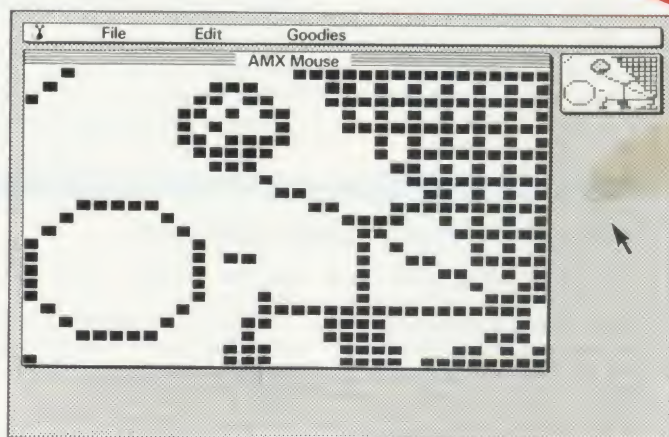
Another remarkable new program for the AMX MOUSE. Now you can enjoy many drawing features you'd never expect to find at this price!

The Zoom facility means easy and accurate amendments to your drawings: one dot becomes a character. You can copy, rotate and reflect; enhance circles; draw ellipses and arcs; and print icons, too. Borders can be added, and pictures can be stripped and centred ready for saving and printing.

There's colour sketch, too...

Great for budding artists!

All disc software is available on 40 or 80 Track and 3" disc. Please state which you require when ordering.

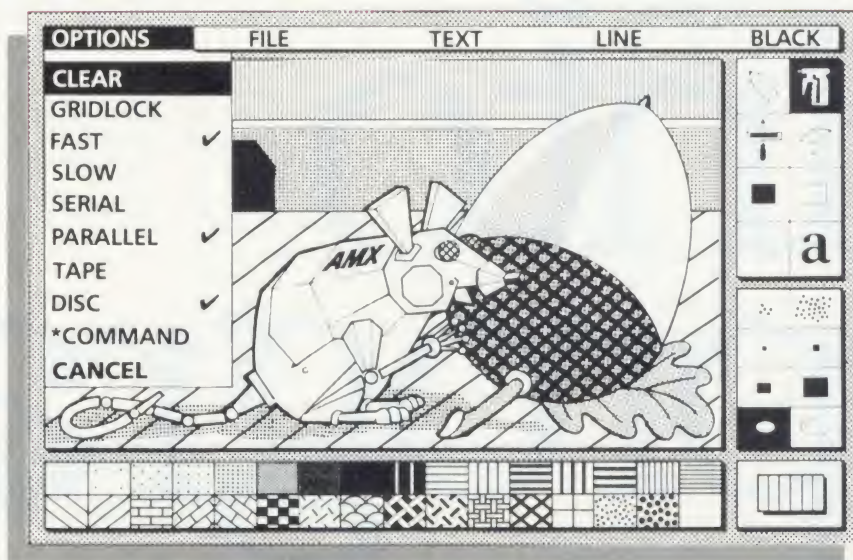


These exciting AMX products are available from top computer dealers. Or you can order direct from us. Send cheque/PO to Advanced Memory Systems Ltd, Green Lane, Appleton, Warrington WA4 5NG. Ring (0925) 62907/602690 for instant ACCESS and VISA orders.

AMX MOUSE

POINTS THE WAY

**FOR THE
BBC MICRO
MODEL B**



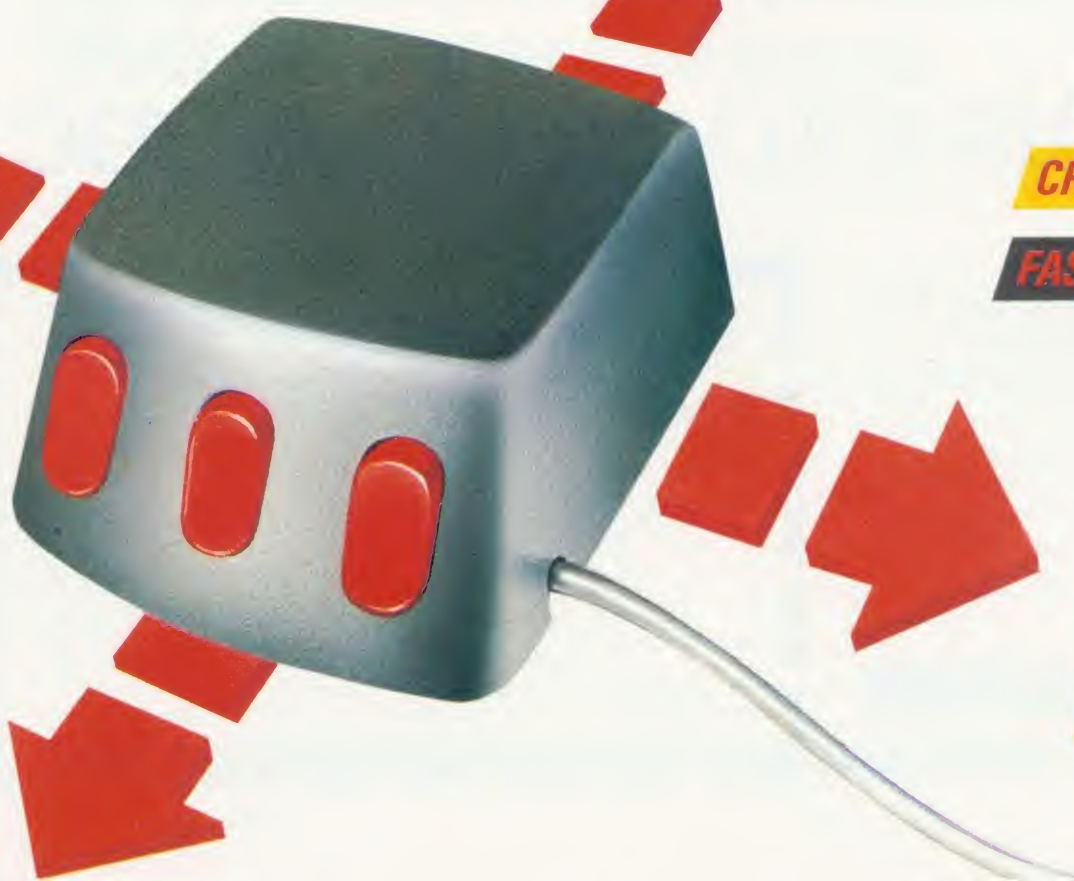
with AMX ART GRAPHICS PROGRAM

EDUCATIONAL QUANTITY DISCOUNTS

ICON SOFTWARE

CREATIVE GRAPHICS

FASTER INTERACTION



£89.95
inc. VAT and P & P

If you're into program writing...

Get this into an envelope

If the programs you are writing involve sophisticated graphics, you have two choices, a severe headache or Touchmaster.

Obviously you'll want to consider the matter, so in the mean time send away for your free Touchmaster literature and find out more about the best value/performance graphics tablet available... or take two pain killers!

TOUCHMASTER



Touchmaster Limited, PO Box 3,
Port Talbot, West Glamorgan, SA13 1WH.

To Touchmaster Limited, FREEPOST, Port Talbot, West Glamorgan, SA13 1ZZ.

Please send me free Touchmaster literature.

AU5/85

Name

Address

Make of
computer

Add discs to Electron

CUMANA has developed a disc interface for the Electron which works through the spare ROM cartridge slot on the Plus 1 add-on, as well as a double density controller for the Beeb.

The Electron product will control 5.25, 3in, or 3.5in drives using single or double density discs (the latter can hold twice as much information). It plugs into the Plus 1 and has a spare socket for ROM software. The device sells for £150, or £130 if a disc drive is purchased at the same time.

For BBC micro owners,

there's a double density disc filing system called QFS. It is supplied as a kit of parts to plug into empty sockets on the BBC's circuit board (issue 4 – the board number is printed on the left near the copyright sign).

No soldering is needed to fit the kit.

Files

QFS costs £108, and apparently runs with *Elite* and *Aviator*. It is not limited to 31 files, as the Acorn DFS is.

The Cumana DFS brings the

number available for the BBC to something like eight. Acorn has yet to announce a replacement for its aged 0.9 system using the 8271 floppy disc controller.

This chip is in very short supply and cannot support double density.

However, the 1770 controller chip from Western Digital is used in Acorn's Plus 3 disc box for the Electron. This does support double density and is used in the ABC range, so would appear to be the successor to the 8271 chip for the BBC.

THE MAN FROM



Our new columnist takes a sideways look at the news...

AFTER all the dust has settled, the interesting topic is where does Sinclair go from here? The Americans, despite some creakings from the direction of Commodore, are relatively secure with their huge home market. Amstrad has wider interests and is doing well (half year pre-tax profits up from £6.3m to £9.5m). Acorn is now in the soft embrace of the men from Turin (whose profits jumped 69 per cent over last year).

Sinclair is still very heavily dependent on one business area – home computing, a market which is showing all the signs of saturation. Forays into midget radios and TVs for those with 20/20 vision have not reduced that dependence significantly. The QL has not been a major success in getting Sinclair into business or education.

The electric trike, wondrous though it is, can only be seen as a big risk. It is hoped that 1986 will bring the launch of the C10, a two seater version (dual in line or transverse?). 1988/90 will see it boosted to the C15, a family four-seater with a top speed of 80 mph, and a range of 40 miles.

Work goes on apace to develop the new batteries needed to make all this come true. Perhaps Sinclair ought to devote a little money to pushing back other frontiers of knowledge.

Maybe they could form a consortium with Tonka Toys and the producers of Action Man to engage in the genetic engineering research necessary to produce a family small enough and daft enough to get into the C15!

Still, Uncle Clive is a fairly shrewd cookie who has come through against the odds before – one more lead balloon and he gets to keep the official receiver. Were his company ever to get into trouble, companies like GEC might move a bit more quickly than they did with Acorn.

15

THE POCKET PROFESSOR

COMPUTER DICTIONARY

THE GUIDE TO COMPUTING TERMS AND CONCEPTS

MICRO MINI MAINFRAME SOFTWARE HARDWARE PERIPHERALS

THIS picture isn't quite full-size, but it is almost. At 361 pages it's 18 mm thick. Definitely pocket-sized.

Software writers' guide

A GUIDE for educational software writers has been produced by the MEP's software unit at £25.

The 276-page book covers origination and design, coding, field trials, support, publication and evaluation of software.

In addition there are notes on BBC and RML machines dealing with speed, memory,

Ex-beauty star granted 7,8 on raft – confusion!

sorting, machine code and robustness. A model publishing agreement is included.

The book, called *Educational Software: a Creator's handbook* is distributed by Techmedia at 5 Granby Street, Loughborough LE11 3LD.

●The CET has released guidelines aimed at making it possible for a database to be used by a wide range of data manipulation packages. The booklet is called *Draft File Interchange Format (FIF)*.

Meet the micro musicman

by Harry Sinclair

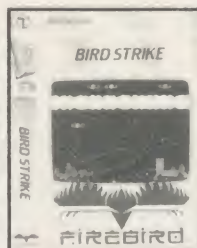
WE'VE all had a little difficulty with the SOUND and ENVELOPE statements haven't we? Controlling four channels isn't easy. Well, how would you like to try it with up to 89 channels?

Melvyn Wright who writes the loading music for BT's Firebird games and Epic's adventures is something of a past master at doing just that.

One of his many talents is making the rolls for 'player pianos' and mechanical organs. Having worked out the arrangement, he has to calculate the exact position of each note on the roll, mark them out with a set square and then cut them out individually with a razorblade.

He says it can take up to a year of spare-time work to pro-

A Long Way to Tipperary is the tune for this title – one of Melvin's nine arrangements



duce one with a complicated arrangement. Handling four channels must seem like bliss.

I had been told that Melvyn, an ex-BT employee, could knock out an opus for the Beeb in a morning, but not so. He reckons an hour for four seconds of music – and *Fingal's Cave* which he did for a recent adventure from Epic lasts six minutes!

Amazingly, considering the complexity of his arrange-

ments, Melvyn doesn't read music. He can hear what he wants in his head, and converts that to notes sitting at the piano.

Part of his secret is the method he has developed which allows him to compress the sound statement data (normally 4 bytes) into 1 byte, so his tunes can be considerably longer than most without grabbing too much memory.

Melvyn only started programming in 1981 on a ZX81. He wrote a program which did the impossible and made that little machine produce music. Moving on to a Spectrum, he was disappointed by its general lack of facilities and its musical abilities in particular.

That's why owners of the Beeb now have the pleasure of hearing his work.

Link to Giant Mainframes and network to thousands of Micro users via your 'phone with free Modems and Comms software in the British Telecom Modem competition.

British Telecom is offering 1000 free gift packs to plug direct into your home 'phone line.

British
TELECOM

MODEM COMPETITION

1000 FREE MODEMS

500 for Spectrum/Spectrum +
350 for BBC Model B
150 for Commodore 64

And if you haven't got a square-type BT phone socket, British Telecom will arrange to alter your installation at no charge!

HOW TO ENTER

(Monday 22nd April to Sunday 5th May 6pm to midnight)

For the 5 questions 'phone

01-627 3000 or
021-449 9944 or
031-225 8999

To get the Tiebreaker Sentence 'phone

01-627 1199 or
0532 455030 or
0632 324444

Complete the entry form using your skill and judgement, and send it off in the next post.

RULES OF THE BRITISH TELECOM MODEM COMPETITION

- 1) The dial-in is available from 6pm Monday 22nd April to midnight Sunday 5th May 1985, when the competition closes.
- 2) Entries must be postmarked the next working day after the questions and tiebreaker were obtained.
- 3) Entries can only be made on the official entry forms and become the property of British Telecommunications plc.
- 4) The competition is open only to residents of the United Kingdom over the age of 18 years. Employees of the Network Marketing Unit of British Telecommunications plc and PARKER REDMILE LTD. and their dependants are excluded. Only one winning entry per household.
- 5) Entries not reaching the competition address before midnight on Thursday 9th May 1985 will not be considered.
- 6) A list of winners will be provided at the competition address. Please send an SAE if you wish to receive it.
- 7) The winners will be picked as follows from entries received on time and properly completed -
The entries for each type of prize pack with all correct answers to the 5 questions and with the tiebreaker sentences judged most apt and humorous by the competition organisers will be chosen, subject to the stock of appropriate prize packs.
- 8) The decision of the competition organisers is final and no correspondence will be entered into. Winners will be notified automatically.
- 9) British Telecommunications plc offers winners requesting BT 'phone socket conversion on entry forms to waive the charge normally made for such work.
- 10) Details of how to get on Prestel/Micronet 800/Telecom Gold will be sent to winners. Subscriptions not included in prize.

OFFICIAL ENTRY FORM

A. Your answers:

Q 1
Q 2
Q 3
Q 4
Q 5

B. Tiebreaker Sentence complete (25 words or less in total):

"
.....
....."

C. If I win, I would like the prize pack for the

- ☐ SPECTRUM/SPECTRUM +
☐ BBC MODEL B (Tick Choice)
☐ COMMODORE 64

D. My home telephone line (* Delete as appropriate)

- (a) already has a square-type BT 'phone socket * or
(b) would need converting to square-type BT 'phone socket *

If (b), the person renting the line from British Telecom must fill in this declaration -
If this is a winning entry, I agree to ask British Telecom to convert my line to square-type BT 'phone socket at a convenient date before 1st July 1985. My line is on Residential rental, is not a coinbox and is not shared service.
I understand British Telecom will not charge for doing the work.

Name (Block Capitals)

Telephone number

Signature

Date 1985

E. I have read the rules of the British Telecom Modem competition and agree to abide by them. I am over 18 years old.

Signature of entrant

Date 1985

Name (Block Capitals)

Address

Postcode

POST IMMEDIATELY TO:-

British Telecom Modem Competition
PO BOX 73
MITCHAM
SURREY
CR4 2XU

(Postage stamp required)

WINNERS WILL BE NOTIFIED AUTOMATICALLY

Question time by modem

ACORN'S chairman Alex Reid and boss of Watford Electronics Nazir Jessa are two of the guests set to appear on Celebrity Chatline, Micronet's live interview feature.

Users of the electronic system will be able to supply their questions in the hour before the show goes out - 7-8pm on Wednesday evenings.

Micronet's editor David Babsky will put these questions to the guests and then send up the answers to appear

on the country's computer screens as they are given.

Reid is scheduled to appear on May 8 and Jessa on April 24. Before then, on April 17, Paul Duffy of the Guild of Software Houses (GOSH) will be interviewed about piracy and how it affects the industry.

Richard Hooper of Prestel and Telecom Gold, who helped set up Micronet, will appear on May 1.

The programme is a spin-off from the Late Night Chatline which was accessed 1.9

million times in January, making it the most popular part of Prestel. Users on the Chatline can log on and talk to each other just like CB radio.

●David Babsky was one of two Micronet staff who took a tumble in a recent parachute jump to raise money for the Ethiopia famine appeal.

He and press officer Claire Walker were still hobbling around on crutches with their left feet in plaster for the first interview. They both landed on sheep.

Six advertisers fall foul of ASA

SINCLAIR and Acorn are among the six companies in the computer market who have fallen foul of the Advertising Standards Authority in recent months.

The others were Software Supermarket, Data Technologies, Solidisk and Viglen. Several of the complaints were about incorrect prices in advertisements, and readers should always check on these before ordering.

The ASA is an independent body set up to monitor advertising claims.

Readers who have problems should write to ASA, Brook House, Torrington Place, London WC1E 7HN.

Summer computer camps for all ages

COMPUTER camps are to be held all over Britain this summer for children and adults. Prices range from £13 a day to £90 a week, although costs vary with transport and facilities.

Dolphin camps cater for children aged 7-14, with BBC micros or Electrons for every child. Beaumont camps use several types of computer. Both feature Logo, robots and programming.

Under-sevens

Daybreaks courses are all focused around London and have similar timetables, but their Earlybird sessions take in computing for the under-sevens.

The Earnley Concourse caters for people over 16 with one- and two-day courses on various aspects of computing,

from what can you actually do with them, through wordprocessing with *Wordwise* to learning Basic. Its computer centre runs BBC micros on an Econet.

Contact Dolphin at Grosvenor Hall, Bolnere Road, Haywards Heath RH16 4BX. Beaumont at 9 West Street, Godmanchester, Cambs PE18 8HG. The Earnley Concourse is at Earnley, Chichester PO20 7JL. Daybreak's address is Providence House, River Street, Windsor SL4 1QT.

Finally, Interaction is a charity which helps people set up their own computer camps. It trains potential course leaders in how to start and offers several books to get you going at the community level.

Interaction can be found at The Royal Victoria Dock, London E16.



Watch this space

SEIKO has announced a wrist watch that connects to a micro. The RC1000 is a quartz watch with LCD display that allows the user to carry an assortment of data, from telephone book to diary, on his wrist.

It has a capacity of 2k and software will be available to connect to Acorn micros. All data is entered from the computer keyboard and transferred through the RS423 serial port to the watch.

Price hasn't been finalised, but is thought to be around £120 for watch, cable (shown fitted) and software. It should be in the shops by July.

Prestel system for Australia

by Steve MacLeod

TELECOM Australia's Prestel-based videotex system, known as Viatel, should now be up and running.

Originally planned for 1982, the proposal was rejected by the then Government, but selection of the Prestel standard for the system was announced last year.

The emphasis so far has been on the quality of the information, rather than the quan-

tity. There will initially be more than 45 information providers supplying news, weather, travel information and a range of consumer services such as home banking and shopping, in addition to electronic mail.

Software

A microcomputing service, including bulletin board facilities and the ability to download software, is expected shortly.

No information was available on which computers will be catered for.

Viatel hopes to attract between 5,000 and 10,000 subscribers in its first year.

Telecom Australia is using Torch CH520 computers to create Viatel pages and for bulk updates of the system. Eight have been supplied by the Australian agent so far with a further 18 systems on order.

Open for repairs

RUMBELOWS has set up a repair service centre in London to cater for electrical equipment including computers.

The service centre is open from 8.30am to 6pm and is at Unit F, Greenford Industrial Estate, Field Way, Greenford, tel: 01-575 7400.

Help with Fortune

EPIC Software, the adventure company whose titles include *Wheel of Fortune*, has released free help sheets for customers who get stuck. Send an sae to 10 Gladstone Street, Kibworth Beauchamp, Leicester LE8 0HL.

Adventure chance

ADVENTURE Zone Software is running a competition with a £1000 cash prize for the best adventure game submitted. The top three will be marketed by the company. Details from 10 Ennis Close, Harpenden, Herts AL5 1SS.

Business for PCW

THE 1985 PCW Show is to be held at Olympia from September 4-8.

A special section for business computers will run alongside the main show in Olympia 2.

Details from Montbuild, 11 Manchester Square, London W1M 5AB.



HAL sings again in 2010 with Dr Chandra

On television

□ *The Learning Machine*, BBC TV's new series on computers and education, starts on April 25. Going out on BBC 1 at 10.55 pm on Thursdays for six weeks, the 25 minute programmes ask whether computers live up to expectations in the classroom. Why do girls miss out? And is learning Basic such a good idea?

It's aimed at parents, teachers and children alike – although at the broadcast time of 10.55 the BBC might be being a bit optimistic there. Leaflets, lists of software and demonstration packages are available from BSS, PO Box 7, London W3 6XJ. (Enclose sae).

□ LOOK OUT for *With a Little Help from the Chip*, a series of six BBC TV documentaries about how computers and new technology can help the lives of the disabled. Transmission times and dates have yet to be decided.

□ THAMES TV's *Database* series returns in June for its third series. More details nearer the time.

□ QED, CAN robots really do as much as people think? The QED team program a robot to pour a cup of coffee – but can it then fetch a chocolate biscuit? Heavy stuff. QED, BBC1, May 29, 9.25 pm.

On radio

□ *Chip Shop*... or rather it's not anymore. And the reason why reads like an episode from *Dallas* (another series that the BBC has lost).

The Radio 4 programme was scheduled to return in April for a third series and by all accounts the previous ones had been massively successful, with over a million micro buffs prepared to endure (sorry – listen to) Barry Norman's dulcet tones – and 3 million for the 'pop' Radio 1 version.

Chip Shop has never really had a proper 'home' or even a permanent staff and so the new series provided the ideal opportunity to press for a permanent studio in Manchester, and full-time staff. With all the furore over the BBC licence fee increase, and with the cor-

□ April 9-20, London Festival of Computing, various locations. Kicks off with a four day extravaganza in Covent Garden (9-12th), featuring demonstrations of robotics, community computing and communications. Over the weekend (12-13th) there's a Logo Spectacular in Camden Town and to wind up (18-20th) there's the London Computer Fair in Central Hall, Westminster.

poration threatening to cancel top-rating programmes such as *Doctor Who*, *Chip Shop* takes a low priority and so the third series has been put on ice. If, as seems likely, the Corporation does not get the licence fee increased to £65, then *Chip Shop* seems destined to go into permanent deep freeze.

□ *Inside Information*, Radio 4 VHF, 4.30 pm, weekly starting May 5. Ten programmes providing a basic grounding in information technology. Subjects include artificial intelligence, communications technology, control applications, etc.

On film

□ On general release is *2010*, the sequel to *2001*. Worth seeing for the special effects which, as you might have guessed, owe a lot to computers. Some of the shots employ up to 10 separate elements – background, spaceships, etc, the movements of which all have to be co-ordinated if the shot is to look realistic. Enter the humble microcomputer, which controls and records the positions of the cameras.

On Show

□ April 16-18, Northern Computer Show 85, Belle Vue, Manchester. Contact 01-643 8040

□ July 25-28, Acorn User Show, Barbican, London.

□ July 29-31, MUSE Summer Course, Jesse Boot Conference Centre, Nottingham University. Three days of talks, conferences and an exhibition covering all areas of computers in education. Things to look out for – Acorn showing off their interactive video and Econet; talks on wordprocessors and spreadsheets in the classroom; six sessions about primary education – plus much more. Price is £57.50 for

the three days and further details are available on (0482) 20268.

□ September 4-8, Personal Computer World Show, Olympia, London.

To contact

□ Acorn (0223) 245200

Acorn (London) 01-379 7358

Acornsoft (0223) 316039

A new bulletin board for modem users (1200/75 baud) is on (0223) 243642.

□ CABE (Computers in Adult Basic Education), c/o Pete Jeffs, Southern Neighbourhood Council, Hyslop Street, Liverpool 8. User group for ABE tutors in Adult and Further Education. Please send sae.

Blunderbox

□ APOLOGIES to one and all, the checksums provided in the Colours Interrupts (April) were incorrect. The checksums should be:

20203

21428

19413

□ MALCOLM Banthorpe's Turtle program (February issue) contained a slight error. In line 470 the + sign should in fact be a – sign. This now means that you turn left when LEFT is entered rather than turning right!

For help

□ To contact *Acorn User* authors, write c/o the editorial address given on page 2.

□ Seikosha AP/GP100 printer help sheets are available from *Acorn User* for 50p, plus sae. These consist of three programs, including a screen dump, and three pages of notes on using these printers with the BBC micro.

□ Monitor choice: Photocopies of the review of four monitors, plus a set of nine test programs from the June issue cost 72p (inc post).

How to present programs and articles

FIRST read the 'Notes for Authors' on the contents page.

Your submission should be original and have a practical use. We receive many articles on subjects we have already covered – often quite recently.

A neat and clear presentation is very important. A few hours' thought about how your article looks, diagrams, appli-

cations and documentation will ensure that it is evaluated quickly and efficiently, and is more likely to be accepted.

Program presentation is also important. Follow the 'standard' we've adopted in the yellow pages. Most importantly, your program must run on Basic 1. The only exception is if the program is of a Basic 2

tutorial nature. Basic and illegal calls to routines in the MOS should not be used. Program lines should increment in steps of 10, with the first four being REMed as per the format in the yellow pages.

Program listings should not be indented, and avoid multi-statement lines.

Use the standard assembler

presentation, one mnemonic per line, upper case mnemonics with lower case labels. If the assembler is long include a checksum.

Provide a list of PROCs, FN's and variables detailing the operation of each on a separate sheet of paper, along with any hints or tips regarding entering the program.

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In case of difficulty or for further information, please contact:

MIRRORSOFT

Mirror Group Newspapers, Holborn Circus,
London EC1P 1DQ. Tel: 01-822 3580

All programs available for
BBC B or
Electron

Oxford Pascal is Fast

Oxford Pascal compiles down to FAST COMPACT P-code, giving you the real speed and power of Pascal, together with the ability to compile very large programs.

Oxford Pascal is Standard

Oxford Pascal is a full extended implementation of Standard ISO Pascal. This means that you can compile any Pascal program (subject to size), written on any computer, anywhere.

Oxford Pascal is Compact

Because it compiles into P-code, Oxford Pascal reduces programs into the most compact form possible. In fact it allows you to pack more code into your BEEB than any other language, and should your programs become too large, you can still use the CHAIN command to overlay limitless additional programs without losing data.

Graphics & Sound Extensions

In addition to the entire Pascal language, Oxford Pascal features a whole range of Graphics (all modes) and sound extensions designed to make maximum use of the BBC computer. Oxford Pascal also provides numerous extensions such as hexadecimal arithmetic and bit manipulation instructions.

Oxford Pascal in Education

In Education, Oxford Pascal is fast becoming a *de facto* standard. It is already the most popular Pascal on the Commodore 64, and will soon be released for the Spectrum and the Amstrad. In fact, Oxford Pascal will soon be available for 90% of the computers installed in the U.K., and is already available in German, French, Swedish, and American versions. Students and teachers alike find that it makes sense to use a standard implementation of Pascal across the whole range of educational micros. Call us for details of our generous educational discounts.

Resident and Disc Compiler

Oxford Pascal comes in two forms:

For Tape Users... Oxford Resident Pascal a compiler located largely in ROM which is available at any time. Programs can be written and compiled on the spot without disc or tape access, and compilation is fast enough to make using the compiler much like using the BASIC interpreter. Thus, learning Pascal is a simple interactive process. Some 15K of memory is available for user programs, the remainder being reserved for compiled object code.

For Disc Users... Oxford Disc Pascal offers all the above PLUS...a full disc compiler which is capable of using the WHOLE memory for Pascal object code, it is supplied with a powerful LINKER, allowing you to break large programming tasks down into separately compilable, easily-manageable files.

Manual

Both these compilers come with a manual which has been carefully designed, not only as a quick reference guide, but also as a full tutorial for those new to Pascal.

OXFORD



ISO
STANDARD

SPEED

TUTORIAL STYLE
MANUAL

FULL DISC
TO DISC
COMPILATION

Compilers like these

PASCAL

**EDITOR
EXTENSIONS**

**GRAPHICS
AND
SOUND**

**INTERACTIVE
RESIDENT MODE**

**FRIENDLY ERROR
REPORTING**



Oxford Computer Systems (Software) Ltd.
Hensington Road, Woodstock, Oxford OX7 1JR, England
Telephone (0993) 812700 Telex 83147 Ref. OCSL

Friendly Error Messages

Many compilers produce little more than an error and line number to help correct mistakes in Pascal programs.

Oxford Pascal however, gives you one of 49 friendly and informative error messages, messages which not only indicate the reason for an error, but also print out the line in question with a pointer to the exact position where the error was detected. Run-time errors are reported using line-numbers from the original source-program with a full explanation of how the error occurred.

Powerful Editor

With Oxford Pascal there is no need for you to learn how to use a new Editor. Pascal programs can be entered in exactly the same way as BASIC programs, without the need to learn any new commands. When you are used to using Pascal, you will find our extensions to the Standard Editor even more useful. What is more, Oxford Pascal allows you to mix BASIC and Pascal together, in much the same way that you can mix BASIC and assembler. In fact you can, if required, mix all three together...BASIC, Pascal and assembler...in one program.

Stand Alone Code

Unlike other compilers, Oxford Disc Pascal allows you to compile on the BBC and then relocate your program so that it will run on the BBC and on the Electron. The relocated program will run without a Pascal ROM and can be loaded and run from tape or disc just like any other program.

This means that you can distribute or sell your software freely and without the need for ROMs, to run on either of the above machines.

Price/availability matrix

	BBC 'B'	ELECTRON	C64	SPECTRUM
DISC	£49.95	Not yet!	£49.95	Available April 1st 1985
CASSETTE	£39.95	£59.95 inc. Cartridge	£22.95	

All prices are inclusive of VAT Please add £2.00 for postage and packing.

Oxford Compilers — The Future

During the next year, we at Oxford will be releasing a series of language implementations such as C, and Modula 2, for the BBC, and other popular micros.

These compilers are being built, using the most modern techniques in automated compiler construction, and will bring to the micro-user, a level of robustness and efficiency, only now becoming available to mini and mainframe users.

Oxford...
the Compiler
Compilers.

...don't grow on trees

Oxford Pascal order form. Please make cheques payable to OCSL Ltd.
Please rush me my copy of Oxford Pascal, I enclose £
including £2 postage and packing
I would like my compiler supplied on DISC ☐ CASSETTE ☐
My computer is BBC 'B' ☐ ELECTRON ☐ C64 ☐ SPECTRUM ☐
Name
Address
Postcode
Telephone

Your BBC would not be without it

Solidisk Sideways RAM is indispensable to all BBC computers

SOLIDISK's SIDEWAYS RAM is an almost indispensable add-on for the BBC user. It is available in either 32k, 64k or 128k byte capacity and is compatible with all issues of BBC microcomputers along with most of the add-ons and ROMs obtainable for it. To date, more than 37,000 units have been sold.

The Sideways RAM occupies the right most ROM socket of the BBC and sits in the same position in the micro's memory map as the paged ROMs.

This means that the Sideways RAM can run almost all ROM type software including languages, utilities and filing systems.

The difference between Sideways RAM and Sideways ROM is that RAM can be written to meaning that only the presently required software has to be loaded into the machine, thus making redundant the multitude of high current consumption and often unsightly ROM extension boards.

Sideways RAM is also an invaluable tool for writing ROM type software to run on the BBC since software may be assembled straight into the area in which the final version will run. This will save a lot of time over using offset assembly and eprom programming/erasing on a non Sideways RAM equipped BBC.

For the user who is not interested in writing ROM type software but is in need of the utilities provided by the use of the Sideways RAM, we supply free software to make maximum use of the Sideways RAM facilities.

These are included in the Sideways RAM Software package, a collection of no less than 5 diskettes containing nearly 100 programs, from database, word processor, music system, sprite graphic, printer buffer, virtual memory, spelling checker, RAM disk, RAM filing system, VDU replay, disassembler, machine code monitor, macro basic, video digitised pictures etc. and Solidisk Most Advanced Disk Filing System version 2.0.

Another extremely useful feature is the ability to configure the Sideways RAM as a 'SILICON DISC' as in our STLDISC program. It makes use of available Sideways RAM as an extra disc drive.

Once the STLDISC program is loaded it acts exactly like a normal DFS with the exception that one drive is now allocated to the Sideways RAM. All operations on this drive are much faster than a physical disc drive and, of course, impart no mechanical wear to them. This means that programs may be repetitively loaded, saved, spooled or exec'd many times and only the final version need actually be saved to disc.

The extensive use of the facilities offered in the STLDISC program will allow the physical disc drives to go longer between services and the discs themselves to last longer and could in fact pay back for itself in a fairly short while.

The STLDISC program will operate on any size of Sideways RAM and will configure itself to the available space. Therefore a 16k board will give 4k bytes of storage, whereas the 32k will give 20k bytes and the 128k up to 116k bytes of 'Silicon disc' storage space.

PRICES

The listed price (effective from the 15 April onwards) comprises the Sideways RAM fully guaranteed for 1 year, comprehensive manual and a software package consisting of 5 diskettes formatted either in 40 or 80 track. Please specify when ordering.

- SWR32 (32k unit, by far the most popular): £58.95
- SWR64 (64k unit, new introduction model): £85.00
- SWR128 (128k unit, the second most popular): £149.00

As Solidisk Software Support Service has to produce in excess of 16,000 diskettes every month, we regret that we can no longer provide personalised service for disk copying. In extreme cases, when you need to update your software diskette, either reorder a new software package (which is always sold to you at nominal media cost (plus post and packing) or return the old package with £2.00 to cover post and packing. You may avoid post and packing costs if you call at Solidisk's stand at any BBC micro exhibition or at the Solidisk office.

UPGRADING

Upgrading from a smaller model is very simple: you return the old RAM board to us with your payment.

The listed prices include the full software package and new manual.

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (10 lines).

WHAT THE SPECIALISTS SAY:

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(JAN 84):

'Exciting . . .'

PCN (MAY 84):

'Power to your

BEEB'

A&B: 'Break the RAM barrier'

THE SOFTWARE PACKAGE

The Software package comprises of 5 diskettes, formatted either in 40 or 80 track. Please specify when ordering.

Volume 1:

Volume 1 contains all the general applications of Sideways RAM such as load and save ROMs (the Menu program), printer buffer (the Printer program), Improved Disk Filing System with unlimited catalog or PAGE at &E00 (STL0E00 and 2.0 ROM), Silicon Disc (the STLDISC program), the Quickcopy and the Fast Backup programs which use Sideways RAM to save you time and disk swapping effort.

Volume 2:

Volume 2 contains the Wordprocessor, Spelling Checker and the English Dictionary.

Volume 3:

Volume 3 contains the Macro Basic (a program generator), a Linker-Editor and the Virtual Memory Program, which lets you use Sideways RAM to store Basic programs thus allowing otherwise too large programs to run.

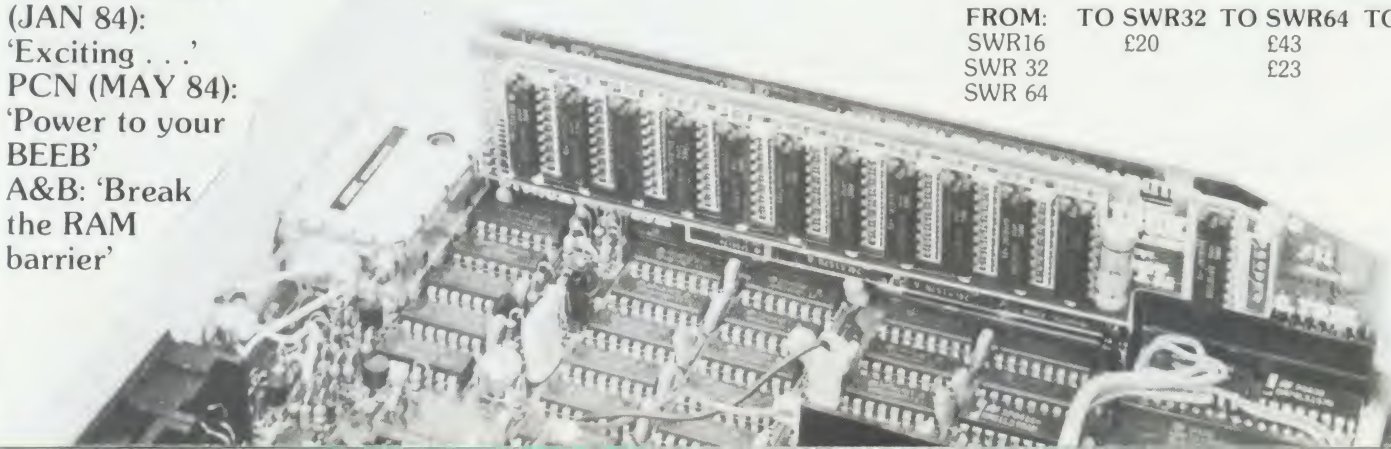
Volume 4:

Volume 4 contains a suite of programs, all part of the Solidisk Database system. This Database allows you to retrieve any record of up to 6500 records quicker than you can remove your finger; each record can have up to 15 fields of up to 60 characters long. 15 utilities are included allowing printing of forms, tabulation, mailmerge, maths etc.

Volume 5:

Volume 5 contains extensive programming aids such as the powerful Solimon, the 65C02 assembler, the Solitrace, a dual screen tracing utility, the Invisible trace, the Sprite and Sprite generator capable of moving 32 sprites anywhere in a single picture frame, the VDU Recorder, which mimics a £10,000 graphic computer and more.

FROM:	TO SWR32	TO SWR64	TO SWR128
SWR16	£20	£43	
SWR 32		£23	
SWR 64			£56



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SOLIDISK DFS ROM 2.0 IS OUT:

The Solidisk Advanced Disk Filing System for the BBC computer is now available for both Solidisk DDFS users and Acorn DFS users as an upgrade for the DNFS 1.2ROM.

Standard features include:

1) Unlimited Catalogue entries (up to disc capacity) without any special preparation.

With Computer Concepts's Disc Doctor or Watford's DFS, you have to specify BEFORE formatting if you want 62 filenames. Once formatted, you can no longer modify the format.

With ROM 2.0, there is no limit to the number of files and programs you can have on the same diskette. Until it is completely full.

2) Unlimited filesize.

This feature is sometimes a very good sales argument for databases.

3) Automatic Write Error Correction.

Every disk write operation is immediately followed by a read operation to ensure that the recorded data is free of all errors. Then if needs be, ROM 2.0 will restart the write operation from the unsafe sector.

4) Automatic 40/80 track stepping.

No other DFS allows you to directly backup a 40 track disk to an 80 track disk, even if you have a switchable disk drive, since the hardware cannot replace the software! ROM 2.0 allows you to backup and copy any 40 track disk to 80 track, single to double density (if available) even on the same drive without any special care.

5) DISC REPAIR FACILITIES.

Disc sector editor (*DZAP), memory editor (*MZAP), recover good sectors (*RECOVER), re-write multiple sectors (*RESTORE), Read disk format (*R40 and *R80), recover bad sectors and bad track (*RTRACK), repair and restore bad sectors and track (*WTRACK) and the powerful disc copy (*DCOPY) which is capable of duplicating even some non BBC disks in under 1 minute in both single and double density (if available).

6) Tape to disc facilities.

This facility allows automatic transfer of all programs and most games to disk (*TAPEDISC and *LOADTAPE). Only in some cases (multi-part game cassettes), will you need Clare's utilities.

7) Wordprocessing facilities.

This facility allows !BOOT and other text files to be edited, saved and printed. Any screen mode and text up to 24k can be handled.

8) PRICE

The 2.0 ROM costs £20.00 to all Acorn DFS users. Included in the price are the Advanced DFS User Manual and VAT.

As an upgrade for the 8k Solidisk DDFS 1.9, the price is only £10.00 inclusive. Please note that you do not have to send back your present DDFS ROM when ordering, but post it later in the return envelope sent together with the 2.0 ROM, quoting your credit card number as a guarantee.

SOLIDISK KEYBOARD AND CPU ARE NOT JUST PRETTY . . .

The keyboard is 12 mm lower than the normal BBC case, 2-3 degrees more angled, weighs only 5lbs, does not skid about on the desk while enjoying 2 feet of freedom from the computer unit — and makes a lot of difference to the typist (even 2 fingered ones!).

The CPU accommodates 2 disk drives and withstands any heavy weight monitor while providing easy attachment for the whole system, CPU and disk drives, to the desk if need be. There is good ventilation to the power supply too and all untidy cables are hidden away.

PRICE

The complete CPU and keyboard case costs £30.00 inclusive + £3.00 post and packing. The system could be yours free as part of the Mitsubishi twin discs offer. Actually the best thing that happened to the BBC computer for a long time!



SOLIDISK + MITSUBISHI BIG DEAL:

THE MITSUBISHI 640K DISK OUTFIT:

This offer comprises:

- One Double Sided, 80 track Mitsubishi M4853 disk drive, cased in beige.
- One Solidisk DDFS Single and Double Density Disc Upgrade.
- All leads and manuals (2).
- One Software package comprising 5 program diskettes as detailed below.
- Full one year guarantee.
- All for £209.95 inclusive of VAT and carriage.

IMPORTANT

If you upgrade (now or later) to twin Mitsubishi M4853 disk system, Solidisk will offer you, subject to stock availability, absolutely free a CPU and keyboard case as shown earlier.

For that, you have the choice of ordering a 640k Mitsubishi disk outfit now and then later on, of returning your disk drive, enclosing payment of £160 to cover the second disk drive and carriage. Alternatively, save by ordering right now a complete twin Mitsubishi (2MB unformatted, 1.3 MB formatted) Fantastic Offer at only £359.95 inclusive.

THE HARDWARE:

As described earlier as shown opposite.

THE SOFTWARE:

The software comprises 5 diskettes, formatted in 80 tracks. Volume 1 contains the Word Processor, Volume 2 the Database, Volume 3 the new Spreadsheet 1.1, Volume 4 the disc, tape utilities and a blank dictionary.

It would take several pages to describe them all. In general, they are of the highest standard as our hardware products. Only the first 2 volumes will be described below.

Volume 1:

Solidisk Word Processor and Spelling Checker with English dictionary. Easier than View, Wordwise or

Scribe, you enter the WP by *WP (filename), then start typing. What you see on the screen will be exactly printed on paper.

You don't even need to read the manual twice, the most useful commands are all displayed on the top part of the screen.

This Word Processor features 80 column screen throughout, direct on screen justification, automatic margins, page numbering, printer special commands, Wordstar like editing commands for block move, block delete, block copy, print, save, load text to cursor, insert and overwrite, search and replace, total word count, word frequency count, free space, * commands etc, etc.

Solidisk WP loads and saves texts under 1 second flat and also you may save the edited version as many times and under any filename you like.

And also better than any other wordprocessor, you can spell check your document without leaving it, simply type in Control-U.



It has self dictionary generating capability too. You may create any dictionary you like simply by entering the words.

Solidisk WP is also excellent as a training tutor for Wordstar, as used on most 16 bit computers.

Volume 2:

Solidisk Database. Solidisk Database is a random access system, completely menu driven and more importantly, very easily customised to suit any particular need.

Important features include unlimited filesize and number of records, all maths functions and 80 column screen throughout. Solidisk Database is particularly simple to understand and easy to use. You are first presented with an option menu, which comprises 15 different options. Each option will then lead to a new menu and so on. Mostly you only have to enter an appropriate data or hit the RETURN key.

You can design a new database, list all records, edit them, merge them, split them, making mailshot with Solidisk WP etc. For instance, Solidisk telephone enquiries are dealt with by an ordinary BBC with twin Mitsubishi holding the last 4000 sales records. Typing in the name you retrieve the complete record quicker than you can remove your finger. It of course runs Solidisk Datafile.

NEW PRODUCT ANNOUNCEMENTS

Solidisk MODEM.

Single chip FSK, Multistandard internal MODEM, requires no soldering, no adjustment.

Supplied with Menu Driven SoliComms 16k ROM, ready to be connected to any information provider such as Prestel or Gold. Auto dialling, auto answer, auto baud rate, auto error correction.

Available soon. Price: £39.95 inclusive.

Solidisk Third Processor

Internally fitted 6502 compatible with Acorn Second Processor, 128k as standard, upgradable to 256k, 4 Sideways ROM sockets, software supplied in ROM allowing unused RAM to be loaded with Sideways Software or used as Silicon Disk. Available soon.

128k 6502 TP: £179.00 inclusive.

256k 6502 TP: £229.00 inclusive.



IN STOCK:

1) NEW LOW PRICE EPROMS.

2764s and 27128s are going down in price.

5 x 2764s now cost you only 24.95 per pack.

3 x 27128 now only 25.95 per pack.

2) PLENTY OF UVIPROMS AND UVIPACS.

3) ELECTRON DISK INTERFACE.

This interface is BBC compatible and includes 3 Sideways ROM sockets.

It Plugs into the PLUS-1 and allows direct attachment of disk drive and software compatibility with BBC disks.

PRICE: £39.95 inclusive, P&P: £1.00.

SOLIDISK LOCAL EXPERTS

We have people able to fit your equipment free of charge in all the following towns. If your area is not mentioned, ring the office!

Dunstable, Leighton Buzzard, Reading, Peterborough, Wimslow, Penzance, Torquay, Wimborne, Basildon, Stroud, Southampton, Hoddesdon, Watford, Bexley, Margate, Rochdale, Boston, London (all areas), Oldham, Hunts Cross, East Dereham, Rushden, West Bridgford, Wantage, Bambury, Grimsby, Kingston, New Malden, Woking, Taunton, King Norton, Sutton Coldfield, Halesowen, Leamington Spa, Hassocks, Salisbury, Swallowne, Leeds, Huddersfield, Treowen Newtown, Newtownards, Co Fermanagh, Co Londonderry, Le Mesnil St Denis (France), Kalgoolie (Australia), Paramatta (New Sth Wales), Manawatu (New Zealand).



Short form price list. Full price list on request.

Qty Items	Prices	P&P
Sideways RAMs:		
SWR32	£58.95	£1.00
SWR64	£85.00	£1.00
SWR128	£149.95	£1.00
CPU & Keyboard		
Case (both)	£30.00	£3.00
Solidisk DDFS.		
DDFS (with 1.9 ROM)	£38.95	£1.00
DDFS (with 2.0 ROM)	£48.95	£1.00
DFDC (with 2.0 ROM)	£54.95	£1.00
8" Controller	£69.95	£1.00
Special Offers.		
640k Disc Offer	£206.95	£3.00
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- Instant conversion of typed ASCII text into speech
- Number pronouncing facility including £, \$ and arithmetic
- Adjustable speed of speech
- Unlimited vocabulary
- Four inflexion levels
- Variable delay time between spoken phrases
- Selectable between phoneme mode/direct text to speech mode

SPECIFICATIONS

CPU	Z80
ROM	8K
RAM	2K
Speech chip	SC01A
Interfaces	Centronics, Serial RS232 or 423
Baud rate	Selectable from 50 to 9600
Audio output	500 m W
Output impedance	8 ohm
Power requirements	220 V, 240 VAC, 50/60 HZ
Power consumption	20 VA
Dimensions	282(L) X 95(H) X 230 (W) mm
Weight	2 kg

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Instant sound effects may be called from Basic, e.g. *ZAP, *SIREN, *EXPLODE etc.

MUROM is accompanied by a full instruction manual and repertoire of music data on cassette.



MUROM CHANNEL EDITOR												
NOTE	CHAN0	CHAN 1	CHAN 2	CHAN 3								
	T E L	N O E L	N O E L	N O E L								
0008	S	-	C#1	1	0	F#0	5	4	SSS	-	-	-
0009	S	-	D#1	1	0	www	-	-	SSS	-	-	-
0010	S	-	E	1	1	www	-	-	SSS	-	-	-
0011	S	-	www	-	-	www	-	-	SSS	-	-	-
0012	S	-	A#1	1	0	www	-	-	SSS	-	-	-
0013	S	-	B	1	0	www	-	-	SSS	-	-	-
0014	S	-	D#1	1	0	D#3	5	1	SSS	-	-	-
0015	S	-	D#2	1	0	www	-	-	SSS	-	-	-
0016	S	-	F	2	1	1	SSS	-	SSS	-	-	-
0017	S	-	SSS	-	-	SSS	-	-	SSS	-	-	-
0018	S	-	SSS	-	-	SSS	-	-	SSS	-	-	-
0019	S	-	SSS	-	-	SSS	-	-	SSS	-	-	-
0020	S	-	SSS	-	-	SSS	-	-	SSS	-	-	-
0021	S	-	SSS	-	-	SSS	-	-	SSS	-	-	-
0022	S	-	SSS	-	-	SSS	-	-	SSS	-	-	-
0023	S	-	SSS	-	-	SSS	-	-	SSS	-	-	-
0024	S	-	SSS	-	-	SSS	-	-	SSS	-	-	-
0025	S	-	SSS	-	-	SSS	-	-	SSS	-	-	-

BBC & Electron

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CODE MONITOR NOW WITH
DUAL SCREENS



05 0D EXMON II by Beebugsoft 12 CP														
A	X	Y	S	P	flags	PC	stack							
45	07	01	FE	30	8	BBC7	A0							
05 0D EXMON II by Beebugsoft 12 CP														
A	X	Y	S	P	flags	PC	stack							
00	00	00	FF	30	8	0000								
8009	:	42	41	53	49	43	00	2B	43	BASIC.CC				
8011	:	29	31	39	38	32	20	41	63	1982 AC				
8019	:	6F	72	6E	0A	0D	00	00	80	orn...				
8021	:	09	00	A9	B4	20	F4	FF	96	...				
8029	:	06	84	07	A9	83	20	F4	FF	...				
8031	:	84	18	A2	00	86	1F	8E	02	...				
8039	:	04	8E	03	04	CA	86	23	A2	...				
8041	:	0A	8E	00	04	CA	8E	01	04	...				
8049	:	A9	01	25	11	05	0D	05	0E	...				
8051	:	05	0F	05	10	0C	A9	41	...					
8059	:	85	0D	A9	32	85	0E	A9	57	...				
8061	:	85	0F	A9	02	8D	02	02	A9	...				
8069	:	84	8D	03	02	58	4C	DD	8A	...				
8071	:	41	4E	44	80	00	41	42	53	AND..ABS				
7P 8000														
7SS 8000+9000"BASIC"														
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Exmon II features include

- * 60 machine code commands.
- * Full dual screen operation.
- * Full screen memory editor, input in hex, Ascii or as assembler instructions.
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- * Move memory block.
- * Verify that two blocks are the same.
- * Relocate code to run at another location.
- * Fill memory with series of hex bytes or Ascii string.
- * Execute all * commands.
- * Single step with skip option.
- * Up to 10 breakpoints which may even be set in Rom.
- * Conditional breakpoints ... e.g. Break if register X=5.
- * User definable work area.

Note: The Electron version does not feature dual screens.

COMMAND SUMMARY

*PLAY	Calls the variable speed, interrupt driven playback routine.
*DISP	Mode 7 display of tune playing.
*TEMPO	Alter tempo.
*KEYB	Use BBC keyboard as a piano keyboard.
*SCORE	Call up full screen music editor.
EDITOR SUB-COMMANDS:	
MODE	Change from editing a single channel to editing all channels consecutively.
GO	Move editor to any note in score.
PLAY	Enable single stepping of music.
OCTV	Change octave of any channel.
ENVL	Change envelope of any channel.
LOAD	Load previously created music.
SAVE	Save edited score to disc or cassette.
KEY	Toggle note entry between note name and keyboard position.
*ENVLP	Sound envelope editor.
*FLUTE,	*SYNTH ... etc. ten predefined envelopes.
*EXPLODE,	*ZAP ... etc. ten predefined effects.
*TRANS	Transpose up or down by a number of semitones.
*MONOC	Disable colour output for monochrome screens.

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TOOLKIT ROM from BEEBUGSOFT

BASIC Programmer's Aid for the BBC micro



```

>HELP INFO
TOOLKIT 1.30
FX 3 0      FX 4 0
FX 5 1      FX 6 10
FX 7 100    FX 8 100
FX 9 25     FX 10 25
FX 11 50    FX 12 8

BS=L0000090A

LISTO 0      WIDTH 0
ERR 26      ERL 0

REPORT: No such variable

Free memory = 20262 bytes
Program size = 5082 bytes
Next free location = 42CDA
PAGE = 41900 LOMEM = 42CDA
TOP = 42CDA HMEM = 47C00

OS 1.20
>
    
```

- 27 new commands to make life easier
- Saves hours in program development and debugging
- Supports both cassette and disc systems

- No command name conflict with other Roms
- Ideal for expert and novice alike
- Fitting instructions and a 32 page manual supplied
- You'll wonder how you ever managed without it

SPECIAL FEATURES INCLUDE

SCREEN EDITOR An extremely powerful editor, allowing the use of cursor keys to list a program line-by-line in either direction and move to any part of a program to overtype or insert new code and corrections.

```

Editing lines 5 to 1470
1 String search
2 Search and replace
3 Move lines
4 List procedures and functions
5 List A% to Z%
6 List numeric variables
7 List string variables
8 List arrays
9 Change edit range
0 Edit program

ESCAPE to exit

Enter option: 1
Search string: K%

640 DEFPROCVAL (X%,Y%,X%,Y%)
670 IFB%K% X%-X%+2:ENDPROC
1450 LOCAL X%,Y%
1460 Buf%:=cmd%: X%:=Buf%:Y%:=Buf%DIV2
50

Enter option: _
    
```

ERROR DETECTION Powerful facility to trap an error in a Basic program as it runs. It will then automatically enter the Screen Editor, display the line in error and position the cursor close to the statement at fault.

"TOOLKIT is an essential utility for all Basic programmers using the BBC Micro... an indispensable aid packed full of powerful utilities."

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"... highly recommended," PCN MARCH 17 1984

"The Beebugsoft Toolkit costs £27 and in my opinion is worth every penny. Since it has been installed in my BBC it has been used extensively and I can find no fault with it. Highly recommended to lazy programmers!"

COMPUTING TODAY JUNE 1984

COMMANDS

- *CHECK Verify a program or data in memory with disc/cassette.
- *CLEAR Clear all variables including integers.
- *EDIT Enter full screen editor.
- *FREE Display free memory and pseudo variables.
- *HELP INFO Display a screenful of useful system information.
- *MEMORY Display memory contents.
- *MERGE Merge a program in memory with one on disc/cassette.
- *MOVE Move program to run at specified address.
- *NEW As NEW, but can be issued from within a program.
- *OFF Cancel enhanced error handling.
- *OLD As OLD, but can be issued from within a program.
- *ON Auto error handling - enters editor at line in error.
- *PACK Efficient program compactor.
- *RECOVER Intelligently recover bad programs.
- *RENUMBER Allow partial renumbering.
- *REPORT Extended error reporting facility.
- *SCREEN Screen dump to cassette or disc.
- *UTIL Display utilities menu.
- *UTIL 1 String search.
- *UTIL 2 String search and replace.
- *UTIL 3 Move Basic program lines.
- *UTIL 4 List procedures and functions.
- *UTIL 5 List values of A% to Z%.
- *UTIL 6 List numeric variables.
- *UTIL 7 List string variables.
- *UTIL 8 List names of arrays.
- *UTIL 9 Set up range for utilities 1 and 2.

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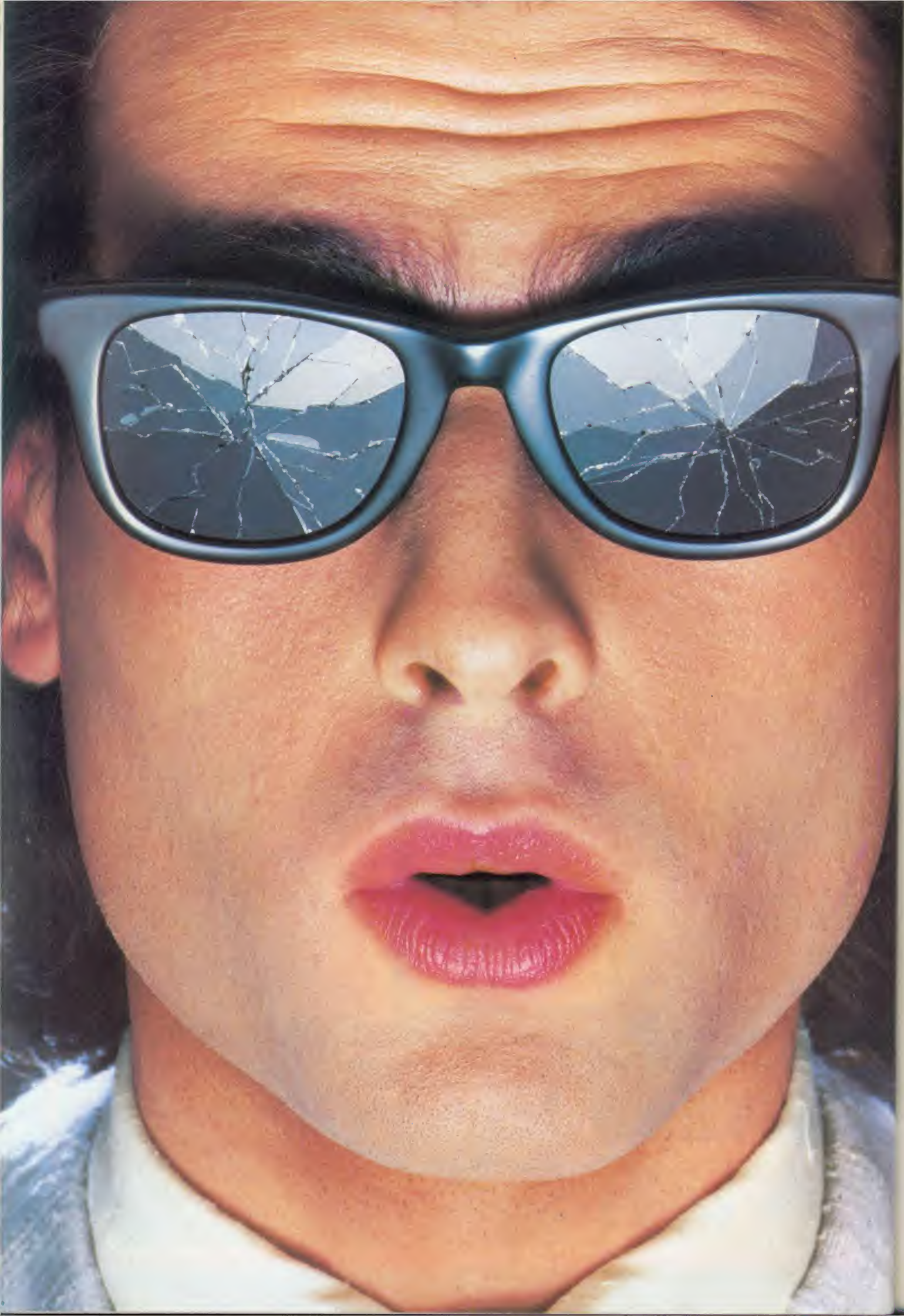
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Shrewsbury. Clairmont Enterprises, Hills Lane. Tel: 3647 52949.
Shrewsbury. Computarama, 13 Castlegate. Tel: 0743 60528.
Telford. Computer Village Ltd, 2/3 Hazeldine House, Central Square. Tel: 0952 506771.
Telford. Telford Electronics, 38 Mall 4. Tel: 0952 504911.

STAFFORDSHIRE

Newcastle-under-Lyme. Computer Cabin, 24 The Parade, Silverdale. Tel: 0782 636911.
Stafford. Computarama, 59 Foregate Street. Tel: 0785 41899.
Stoke-on-Trent. Computarama, 11 Market Square Arcade, Hanley. Tel: 0782 268524.

SUFFOLK

Bury St. Edmunds. Boots, 11-13 Cornhill. Tel: 0284 701516.
Bury St. Edmunds. Suffolk Computer Centre, 1-3 Garland Street. Tel: 0284 705503.

SURREY

Bagshot. P & H Electronics, 22-24 Guildford Road. Tel: 0276 73078.
Croydon. Laskys, 77-81 North End. Tel: 01-681 8445.
Croydon. The Vision Store, 53-59 High Street. Tel: 01-686 6362.
Croydon. The Vision Store, 96-98 North End. Tel: 01-681 7539.
South Croydon. Concise Computer Consultants, 1 Carlton Road. Tel: 01-681 6842.
Epsom. The Micro Workshop, 12 Station Approach. Tel: 0372 721533.

Guildford. Walters Computers, Army & Navy, 105-111 High Street. Tel: 0483 68171.
Wallington. Surrey Micro Systems, 53 Woodcote Road. Tel: 01-647 5636.
Woking. Harpers, 71-73 Commercial Way. Tel: 0486 225657.

SUSSEX

Bexhill-on-Sea. Computerware, 22 St. Leonards Road. Tel: 0424 223340.
Brighton. Boots, 129 North Street. Tel: 0273 27088.
Brighton. Gamera, 71 East Street. Tel: 0273 728681.
Brighton. Laskys, 151-152 Western Road. Tel: 0273 725625.
Crawley. Gatwick Computers, 62 The Boulevard. Tel: 0293 37842.
Crawley. Laskys, 6-8 Queensway. Tel: 0293 544622.
Eastbourne. Boots, 15 Eastbourne Armale Centre. Tel: 03232 7742.

TYNE & WEAR

Newcastle-upon-Tyne. Boots, Eldon Square. Tel: 0632 329844.
Newcastle-upon-Tyne. Laskys, 6 Northumberland Street. Tel: 0632 617224.
Newcastle-upon-Tyne. RE Computing, 12 Jesmond Road. Tel: 0632 815580.

WALES

Aberdare. Inkey Computer Services, 70 Mill Street, The Square, Trecynon. Tel: 0685 881828.
Aberystwyth. Aberdara at Galloways, 23 Pier Street. Tel: 0970 615522.
Cardiff. Boots, 26 Queens Street & 105 Frederick Street. Tel: 0222 31291.
Cardiff. Cardifl Microcomputers, 46 Charles Street. Tel: 0222 373072.
Cardiff. The Computer Shop, 41 The Hayes. Tel: 0222 26666.
Cardiff. Laskys, 32-36 Town Wall, St. Davids Centre. Tel: 0222 41619.
Cardiff. Randall Cox, 18/22 High Street Arcade. Tel: 0222 397162.
Mold. Clwyd Personal Computers, Unit 19, Daniel Owen Precinct. Tel: 0352 56842.
Newport. Gwent Computers, 92 Chepstow Road. Tel: 0633 841760.
Swansea. Boots, 17 St. Marys Arcade, The Quadrant Shopping Centre. Tel: 0792 43461.
Swansea. The Microstore, 35-36 Singleton Street. Tel: 0792 467980.

WARWICKSHIRE

Coventry. Coventry Micro Centre, 33 Far Gosford Street. Tel: 0203 58942.
Coventry. Impulse Computer World, 60 Herford Street Precinct. Tel: 0203 553701.
Coventry. JBC Micro Services, 200 Earlsdon Avenue, North Earlsdon. Tel: 0203 73813.
Coventry. Laskys, Lower Precinct. Tel: 0203 27712.
Leamington Spa. IC Computers, 43 Russell Street. Tel: 0926 36244.
Leamington Spa. Leamington Hobby Centre, 121 Regent Street. Tel: 0926 29211.
Nuneaton. Micro City, 1a Queens Road. Tel: 0203 382049.
Rugby. O.E.M., 9-11 Regent Street. Tel: 0788 70522.

WEST MIDLANDS

Birmingham. Boots, City Centre House, 16-17 New Street. Tel: 021-643 7582.
Birmingham. Laskys, 19-21 Corporation Street. Tel: 021-632 6303.
Dudley. Central Computers, 35 Churchill Precinct. Tel: 0384 238169.
Stourbridge. Walters Computer Systems, 12 Hagley Road. Tel: 0384 370811.
Walsall. New Horizon, 1 Goodall Street. Tel: 0922 24821.
West Bromwich. DS Peakman, 7 Queens Square. Tel: 021-525 7910.

YORKSHIRE

Bradford. Boots, 11 Darley Street. Tel: 0274 390891.
Leeds. Boots, 19 Albion Arcade, Bond Street Centre. Tel: 0532 33551.
Sheffield. Laskys, 58 Leopold Street. Tel: 0742 750971.
York. York Computer Centre, 7 Stonegate Arcade. Tel: 0904 641862.



TECHNOMATIC

BBC Computer & Econet Referral Centre

17 Burnley Road, London NW10 1ED Tel: 01-208 1177

305 Edgware Road, London W2 Tel: 01-723 0233

Please add carriage: (a) £8; (b) £2.50; (c) £1.50; (d) £1 and 15% VAT to order value

MAY '85

ACORN COMPUTER SYSTEMS

BBC Model B.....	£299(a)
BBC Model B + DFS.....	£346(a)
BBC Model B + Econet.....	£335(a)
BBC Model B + Econet + DFS.....	£399(a)
ACORN 10Mbyte Hard Disc.....	£1300(a)
BBC Dust Cover.....	£4(d)
BBC Carrying Case.....	£12(b)

UPGRADE KITS

A to B.....	£55 (d)	1.2 O/S Rom.	£7.50 (d)
Acorn DFS Kit	£89 (d)	DNFS Rom.	£17.50 (d)
Econet Kit.....	£55 (d)	4816AP RAM	£1.50 (d)
Basic II Rom with User Guide.....	£22.50 (d)		
1.2 O/S Rom.....	£7.50	DNFS Rom.....	£17.50
4816AP Memory upgrade RAM (each)	£2.00		

ECONET ACCESSORIES

Econet Starter Kit.....	£85 (b)	Printer Server Rom.....	£41 (d)
File Server Level I.....	£75 (d)	10 Station Lead Set.....	£26 (c)
File Server Level II.....	£210 (d)	Adv. Econet User Guide.....	£10 (d)

ACORN BITSTICK

The renowned 'BITSTICK' graphic CAD package. Using the on-screen menu and colour palette, it can draw freehand as well as lines and shapes with great accuracy. Any part of a drawing may be magnified many times, and up to 48 drawings may be saved on a disc. In total, a friendly yet sophisticated CAD system offering tremendous value. **£325(a)**

ACORN's multiplotter driver for Bitstick graphics. **£79(c)**

(All popular plotters included)

Epson FX80 screen dump routine for Bit Stick. **£35 (d)**

ACORN WINCHESTER DRIVES

Acorn Hard Discs are now available in 10 and 30 Mbyte versions. The drive plugs into the 1 MHz bus. The ADFS filing system with its hierarchical filing structure provides excellent file management facilities. Data transfer rate of 1 Mbit/sec and average seek time of 85 ms provides the user very fast access to very large amounts of data. File Server Level III can be installed on the Hard Disc before delivery.

10 Mbyte Winchester Drive **£1300 (a)**

30 Mbyte Winchester Drive **£1999 (a)**

Add £200 to the cost if File Server Level III is to be installed.

ACORN Z80 2nd Processor

This processor converts your BBC into a CP/M based business micro providing it with computing power a professional would need. The free software package supplied includes three office productivity programs (word processor, spreadsheet and a database), NUCLEUS report generator, a business program ACCOUNTANT plus three programming languages and comprehensive manuals. All for only **£348 (a)**

See our section on CP/M software for other packages available for use with this processor.

ACORN 6502 2nd Processor

This processor is designed for the serious computer user who wants to get even more out of his micro. It increases memory by upto 44K for BASIC programs and upto 60K for assy. lang. programs regardless of the screen mode (Ideal for VIEW and WW+). Programs run upto 50% faster. This combination offers computing power of systems costing twice as much. **£175 (a)**

ACORN P-SYSTEM

NEW

The long-awaited-for portable operating system has arrived. Intended for use with the 6502 Second processor, this portable operating system is a complete implementation and comes complete with a Filer, Editor, and compilers for two languages, USCD PASCAL and FORTRAN-77. Widely used in universities and colleges, as well as being popular with business software authors, P-System is user-friendly, offering ease of program development as well as portability. **£263(b)**

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- *Technical Pages *Comments on Stock and availability of Products
- *Placing of Orders and many others...

Techno-Line 01-452 1500
Weekdays: 18.30 to 09.30
Sunday: 24 hours

Technical Information: Automatic V21/V23 for both 300/300 and 1200/75 Baud. Standard Viewdata/Prestel Protocols. Please note that a 'Prestel' type terminal must be used.

TORCH GRADUATE SYSTEM

The ultimate upgrade — converts your BBC into a powerful 16 Bit business computer and makes it disc and hardware compatible with the IBM PC. With 256K RAM and single/dual drives, it simply connects through the 1MHz bus. (The disc drives can be used in both BBC and IBM mode, without requiring a disc interface.) The top-of-the-range Model G800/2 comes complete with the free Xchange range of software, and includes a full-feature word processor, a financial planner, a database and a business graphics package — all 'linkable'.

(This highly acclaimed software is now available for the IBM PC at a cost of over £400!)

G800/2: **£999(a)**

OTHER TORCH PRODUCTS

Z80 Card ZEP100 with PERFECT Software Packages

+ Z80 Basic..... **£275(a)**

Z80 Disc Pack ZDP240 with software as above..... **£650 (a)**

20Mb Hard Disc + 1 x 400K Floppy Drive..... **£1,950 (a)**

Unicorn 68000, Unix OS/Z80B/512K, 20MB

Hard Disc, 400K Floppy..... **£3495 (a)**

TECHTEL 'IN-HOUSE' INFORMATION CENTRE

A unique concept that allows you to provide information in public places. A member of the public is able, without assistance, to view information about your products or services.

Techtel is a complete package allowing you, in conjunction with a BBC and disc drive, to set up an in-house 'Viewdata' type information system. The friendly software package will allow you to set up a 'Prestel' type database of up to 700 pages, (depending on drive) containing both graphics and text. This menu-driven database could hold details of products or services supplied by your company. Typical user would be any company needing to pass information to the public e.g. banks, dept. stores, hotels, travel & estate agents etc. etc.

The package also includes a 'carousel' type display, allowing each frame to be displayed for a specified time, before moving on to the next frame.

A unique facility of Techtel is its 'through-glass' keyboard. Its special numeric keyboard can be placed inside a shop window, yet may be used by customers outside — thus allowing the unit to be left unattended.

The package includes the special keypad, Teletext Loader and Editor, and full instructions. **£175(b)**

PRINTERS

ALL PRINTERS HAVE A 12 MONTH GUARANTEE

DOT MATRIX

KAGA TAXAN:

- * Epson Compatible Control codes
- * 80 or 156 Column
- * NEAR LETTER QUALITY Print using 23 x 18 matrix
- * Text Modes include Normal, Italic, Enlarged, Condensed, Super/Sub Script, Proportional
- * Dot Addressable graphics in various modes
- * 3K buffer which can also hold user defined characters
- * Extra ROM/RAM socket for custom print fonts
- * Friction & Tractor feed with built in paper roll holder

KP810 (80 column) £255 (a) KP910 (156 column) £349 (a)

EPSON:

The industry standard printer offering the quality, reliability and versatility.

RX80T £210 (a) RX80FT £220 (a) RX100 £345 (a)
FX80 £315 (a) FX100 £430 (a)

BUFFALO 32K Buffer for EPSON PRINTERS

This compact 32K buffer can be fitted internally on any EPSON printer within a few minutes. It does not require external power or any modification to the printer. It will hold about 15 A4 pages of text freeing your computer for other jobs in a fraction of the time it would normally have to wait for the printer to finish all that printing. Supplied with full fitting instructions. £99(d)

DAISY WHEEL

BROTHER HR15: • 14 cps • 3K Buffer • Two colour printing • Proportional spacing • Underline • Bold • Shadow print • Super/Sub script + many other features.

BROTHER HR15 £325(a)

JUKI 6100: • 15 cps • 2K Buffer • Switchable 10/12/15 cpi • Proportional printing • Linear Motor for max reliability.

JUKI 6100 £325(a)

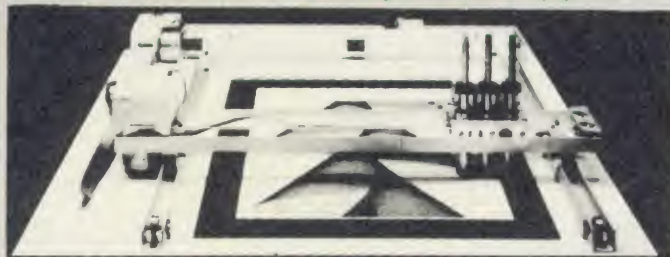
VIEW & VIEWSHEET PRINTER DRIVER GENERATOR

This printer driver generator comes with predefined drivers for EPSON FX80, JUKI 6100 and lets you generate printer driver for any BBC compatible printer. Gone are the days when you had to buy dedicated drivers. The screen driver program supplied with it lets you view the text as it is going to appear on the paper including the bold, italics, underlined characters etc. Supplied on disc. £10(d)

GRAPHICS PLOTTER/WORK STATION

Equally at home in the artists studio, hobbyists workshop, science lab or a classroom, this system has something to offer for everyone. The 3 colour graphics plotter provides both precision and versatility. The carriage can be moved with an accuracy of 0.025cm over an A4 area — the plotter being able to accept paper and far thicker materials at sizes of up to A3. The basic plotter carries 3 colour pens each of which is software selectable. Additional accessories greatly enhance the versatility of the unit without losing the accuracy. The servo controlled drill/router, and scribe can be used on various materials. A unique Opto Sensor (using a Hewlett Packard device) turns the plotter into a high-res scanning digitiser to read & store whole diagrams and photographs. Workstation comes complete all accessories.

Workstation Complete £490(a)



Basic Plotter £270(a)

Opto Sensor £72(c) Drill/Router Attachment £79(c)
Power Supply: PS12V £42(c) PS24V £78(c)
Scandump Utility Disc £14.95 (d)

TECHNOMATIC

All prices exclude VAT

PRINTER ACCESSORIES

EPSON

Paper Roll Holder £17(d) FX80 Tractor Attachment £37(c).
Interfaces: 8143 RS232 £28(c); 8148 RS232 + 2K £57(c).
8132 Apple II £60(c); 8165 IEEE + Cable £65(c).
Serial & Parallel Interfaces with larger buffers available.
Ribbons: RX/FX/MX80 £5.00(d); RX/FX/MX 100 £10(d);
FX80 Dustcover £4.50(d)

KAGA TAXAN: RS 232 Interface + 2K buffer £78(c); Ribbon KP810/910 £6(d)

JUKI: RS232 Interface £65(c); Spare Daisy Wheel £14(d); Ribbon £2.50(d);
Sheet Feeder £182(a) Tractor Feed Attach £129(a)

BROTHER HR15: Sheet Feeder £189(a) Ribbons Carbon or Nylon £4.50(d)

BBC Printer Lead: Parallel (42") £7(d); Serial £7(d)
Printer Leads can be supplied to any other length.

Plain Fanfold Paper with extra fine perforation (Clean Edge):

2000 sheets 9.5" x 11" £13(b) 2000 sheets 14.5" x 11" £18.50(b)
Labels per 1000s: Single Row 3 1/2" x 1 7/16" £5.25(d)
Triple Row 2-7/16" x 1 7/16" £5.00(d)

EPSON HI-80 PLOTTER

EPSON technology has once again scored a first by introducing a sophisticated A4 size plotter that does not need specialised software or programming skills to operate it and yet keep the cost within the reaches of all computer users. Features include 4 pens at a time — upto 10 colours to choose from, a variety of pen nibs, high speed plotting. Powerful software command codes include single commands to plot circles, ellipses or triangles. Line or bar graphs and pie charts can be plotted in a variety of exciting styles very simply by keying in the data into the computer. Detailed leaflet on request. £399 (a)

PRINTER SHARER/BUFFER

A unique sharer/buffer that provides a simple solution to improve system utilisation. It can be connected to up to three computers and it will automatically switch between the computers to scan for data — no manual switching required. High speed data input rate to the buffer cuts down the normal waiting time for the computers for the printing operation to complete and thus allowing the computers to be used for other uses. The 64K buffer would hold over 30 A4 pages of text.

Facilities include: COPY, PAUSE AND RESET. LED indication for percentage of memory available and data source. Mains powered. Send for detailed specification.

TSB 64 Buffer/Sharer £245(a)
BBC Cable Set £30

PERIPHERAL & COMPUTER SHARERS

We now offer an extended range of peripheral sharers to allow the user to switch between computers, printers and modems. High quality switching mechanisms housed in fully shielded metal cases ensure reliability. No external power input required.

All lines on the sharers are fully switched (36 on parallel and 25 on serial)

	Parallel	Serial
3 Computers to a Printer	36V36-3 £69(c)	25V25-3 £64(c)
4 Computers to a Printer	36V36-4 £85(c)	25V25-4 £74(c)
2 Computers/2 Printers X-over	36V36-X £69(c)	25V25-X £69(c)
BBC Cable Set 3 to 1 (1m ea.)	£32(c)	£34(c)
BBC Cable Set 4 to 1 (1m ea.)	£39(c)	£41(c)

Computer Sharer:

1 computer to 2 printers fitted with Cable for BBC TCS26 £19.50(c).

GRAFPAD

A low cost graphic tablet offering the performance & durability required by industrial and educational users. It is compact, accurate & reliable; working area 240 x 192mm + menu area. Comes complete with a CAD package. £110(b).
DDX software £99(b).

01-208 1177

Please add carriage: (a) £8; (b) £2.50; (c) £1.50; (d) £1 and VAT at 15% to order. Carriage (a) sent by Datapost

MONITORS

All monitors supplied with BBC lead

MICROVITEC

All 14" monitors now available in plastic or metal cases, please specify your requirement.

14" RGB

1431 Std Res	£165(a)	1431 AP Std Res	£205(a)
1451 Med Res	£240(a)	1451 AP Med Res	£280(a)
1441 Hi Res	£389(a)	These monitors can receive TV programs thru a Video Recorder	

with PAL & Audio

20" RGB with PAL & Audio

2030CS Std Res	£380(a)	2040CS Hi Res	£685(a)
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KAGA TAXAN 12" RGB

VISION II Hi Res	£225 (a)	VISION III Super Hi Res	£325 (a)
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SANYO CD3125NB 14" RGB Std Res £169 (a)

MONOCHROME MONITORS:

SANYO DM8112CX Hi Res 12" Green Screen	£90(a)
KAGA KX1201G Hi Res 12" Etched Green Screen	£99(a)
KAGA KX1202A Hi Res 12" Etched Amber Screen	£105(a)
PHILIPS DGD Hi Res Green Screen	£75(a)
ZENITH 122 Hi Res 12" Amber Screen	£68(a)
Swivel Base for Kaga Monochrome fitted with Digital Clock	£21(c)
Monitor Plinth for the BBC	£13.50(b)
Double Tier Plinth for BBC and flat pack dual drive	£19.50(b)
BBC Leads Kaga RGB £5(d) Microvitec £3.50(d) Monochrome £3.50(d)	

RB2 TRACKER BALL



Marconi with its years of experience making tracker balls for use in Military and Air Traffic Control have developed a quality device for the serious hobbyist, for educational uses, and for low cost CAD/CAM applications. RB2 is a compact, ergonomically designed tracker ball that provides precise positional control and rapid direction changing using a freely rotating resin ball in any direction without the limiting stops or the zero point drift of joystick controls. Three switch

buttons enable easy software manipulation to incorporate the use of the tracker ball. Appropriate software will enable the RB2 to take over the functions of cursor keys in word processing, CAD/CAM applications and two dimensional positional controls of robots, drillheads etc. RB2 which plugs into the user port is supplied with utility programme to use it as a joystick with other software, a comprehensive graphics/CAD program and a program demonstrating its editing capabilities. User guide includes instructions on writing your own programs for the RB2. £52(b)

AMX MOUSE

In conjunction with a controlling ROM this sophisticated mouse has many advanced features such as Icons, Windows etc., these can be used in ordinary programs as well as sophisticated CAD Design. The supplied 'AMX ART' is a superb, yet simple-to-use CAD package allowing the creation of amazing graphical designs. A screendump for drawings is included. It can also be used with Wordwise/View to replace the cursor keys. Supplied complete with CAD Package, ROM and full instruction manual. £75(b)

DISC DRIVES



TECHNOMATIC disc drives come fitted with high quality slimline Japanese mechanisms and represent the state of art in disc drive technology. They are built to highest standards and are all tested to their full performance capability before packaging. All versions of drives are offered with or without integral power supplies. Power supplies for dual drives are of switch mode type and generously rated. Attractively designed steel casings are painted in hard wearing BBC in matching paint. All dual drives can be supplied in stacked version or with built in plinths. The plinth version cases are of sturdy construction to carry any monitor and provide a simple method of having a compact computer system installation. All drives can operate in single and double density modes. Drives are supplied with cables, manual and formatting disc and are ready to be fitted to the computer.

Single Drives:

1 x 100K 40T SS	TS100	£85(b)	PS100 with psu	£125(b)
1 x 400K 80/40T DS	TS400	£125(b)	PS400 with psu	£149(b)

Dual Drives:

Stacked Version:				
2 x 100K 40T SS	TD200	£175(a)	PD200 with psu	£200(a)
2 x 400K 80/40 DS	TD800	£275(a)	PD800 with psu	£300(a)
Plinth Version:				
2 x 100K 40T SS	TD200P	£195(a)	PD200P with psu	£220(a)
2 x 400K 80T DS	TD800P	£295(a)	PD800P with psu	£315(a)

DISC DRIVE MULTIPLEXER

A simple device that enables up to four computers to be connected to one single or dual drive. Ideal unit for installing in classrooms where networking is not planned or necessary or the costs have to be kept low or where software information is shared. Several of these units can be installed in series to connect more computers to access the same discs. Units supplied with 5' of cable per outlet as standard. Mains powered.

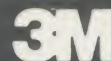
TDM 4 Quad Unit (upto 4 computers) £135(a)

TDM 2 Dual Unit (2 computers) £75(b)

Note: All computers must be fitted with a DFS

3M FLOPPY DISCS

Authorised Distributor
Data Recording Products



Industry standard high quality discs with guaranteed error free performance for life.

Discs in packs of 10:

40T SSDD £15(c)	40 T DSDD £18(c)
80 T SSDD £22(c)	80 T DSDD £24(c)

DISC ACCESSORIES

Single Disc Cable £6(d)	Dual Disc Cable £8.50(d)
10 Disc Library Case £1.80(d)	30 Disc Case £6.00(c)
Lockable Storage Boxes 40 Discs £14(c)	100 Discs £19(c)

The FLOPPICLENE disc head cleaning kit is the ideal way to ensure the optimum performance of your drives. The use of disposable cleaning discs eliminate the risk of recontamination and abrasion of the sensitive disc heads and ensure continuously reliable data capture and transmission.

Floppiclene with 20 disposable cleaning discs. £14.50(b).

COMMUNICATIONS

MODEMS

ACORN PRESTEL: The official Acorn add-on — an advanced BT Approved. Auto-Dial, Prestel Terminal ideal for British Telecom Gold. Comprehensive software includes 'tagged' frames, downloading of Telesoftware, saving of frames, printing, sophisticated 'Mailbox' handling c/w editor. A built-in speaker allows line monitoring. A simple !BOOT file allows automatic operation **£99(b)**

BUZZ BOX A full spec, BT approved, pocket size, direct connect modem with both originate & answer modes, full & half duplex, allowing access to many databases, bulletin-boards as well as Intercomputer communications. It conforms to CCITT V21 300/300 Baud Standard. Battery/mains powered **£62(c)** BBC Lead **£6** External PSU **£9(c)**

MINOR MIRACLES WS2000 A world standard modem, having BT approval, covering V21,V23,BELL 103/113/108 and including 75,300,600,1200 Baud ratings. (It even includes 'reverse Prestel!'). This is the modem that will cover 'Prestel' type systems as well as Bulletin Boards both in the UK and abroad. What possibly gives this modem its biggest advantage is its option of computer control. A 25Way RS232 input as well as possible

computer controlled auto-dial/auto-answer makes this modem unique. WS2000 **£129(c)** BBC Serial Cable **£7**

WS2000 Auto-Dial card: includes an integral loudspeaker for monitoring of the phone line **£30(d)**. BBC User Port cable (for modem control) **£7**.

SKI KIT (Allowing total control of the modem by your computer) **£10**.

DS1 Disc (for Commstar): When used with the Auto-dial card, SK1 Kit, and a user port cable, this software will dial out to Prestel, enter your password etc. and leave you in Commstar. Will also store many bulletin board telephone numbers for autodialling **£10**.

WS2000 Auto-Answer Card **£30(d)**.

(Please note that the A/D & A/A Cards are still awaiting BABT Approval.)

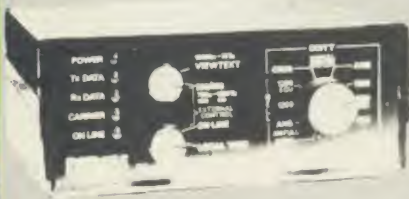
DEMON A High Performance, yet low-cost Modem. Features include: Auto-dial & auto-answer, Auto baud rate scan, 75,300,1200 Baud rates with V21, V23 and Bell standards. Sophisticated software in ROM allow many features like: Auto-Dial, Redial, Remote facilities etc. An Auto-Dial disc allows storage of commonly dialled numbers. UNICOM **£49.95(b)** Unicom ROM **£20** Unicom Disc **£9.95** Unicom Cable **£6(d)** Not BT approved

TELEMOD-2 A BT approved modem complying with CCITT V23 1200/75 Duplex & 1200/1200 Half Duplex standard, that allows communication with Viewdata services e.g. Prestel, Micronet etc., as well as using 1200 Baud for communicating with other computer users. Mains powered. TELEMOD 2 **£65(b)** BBC Lead **£7.00**

COMMSTAR An ideal communications Rom. Extremely easy to use, yet very versatile. It features both a Prestel mode as well as a Terminal mode, thus offering very good value for money. In Prestel mode, all normal Prestel features are available including, downloading of software, saving and retrieving of pages on disc, page tag, revealing of hidden text etc. Its terminal mode is ideal for bulletin boards etc. All input may be copied into a buffer in memory over which full control is available. Controls of protocols are very simple and any type of file, (not just ASCII) may be sent using XModem protocols. Even includes an elapsed time-clock. **£29(d)**

TERMI-II A good all round package for communicating with notice boards, electronic mail services etc. Termi is a semi-intelligent terminal emulator allowing the BBC to act as a dumb terminal, slave BBC graphics terminal, or VT52 terminal. The rates at which data is sent or received is easily set up with rates of up to 4800 Baud with 40/80 col. selectable. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Termi is not suitable for PRESTEL). **£28(d)**

COMMUNICATOR This is a full 80 col VT100 terminal emulation program on 16K eprom. It is a more advanced program than TERMI and features easy to follow screen menus. The rate at which data is sent or received is easily set up with rates up to 19200 Baud with 80 column text. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Communicator is not suitable for PRESTEL). **£59(d)**

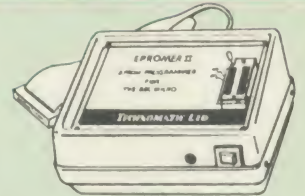


TECHNOMATIC

All prices exclude VAT

EPROMER II

A sophisticated eprom programmer that handles the full range of single rail eproms (incl 27256) and allows the user full control of the programming process.



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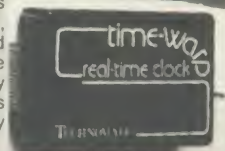
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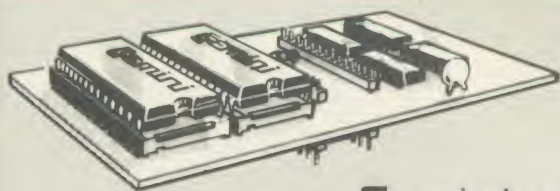
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SPELLCHECK II: A rom based fast machine code program that works with both VIEW and WORDWISE. Vocabulary disc supplied with 6000 words can be expanded to well over 17000 words on 100K drive. Fully compatible with 6502 second processor. £26(d)

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The differences between Basic 1 and 2, disabling the Break key and a chart of teletext characters are among Martin Phillips' topics

Keeping hands

off the

Break key

I GET many requests for methods of disabling the Break key in programs. At a superficial level it can be disabled (*KEY10 OLDIM RUNIM), but it's very difficult to protect all programs from the effect of pressing it.

Two sorts of protection have been requested. The first is for methods of disabling it against the deliberate Break key-pushers. This problem is very difficult to overcome because even if the Break key is protected they will find other methods to interrupt a program, eg, switch the machine off at the back. Even the most elaborate program cannot overcome this!

The second is for the inadvertent pressing of Break. This is often requested by school teachers who are frustrated when a program has to be loaded in again. This becomes less of a problem when the children become familiar with the machine, as they soon learn not to press the Break key.

For the latter problem there are three solutions – I shall list them in order of ease and usefulness.

The most obvious solution is not to press the Break key! Often beginners press it simply to clear the screen or stop a program, and it becomes a habit. It's not difficult to teach even very young children that this key should not be pressed. They will, of course, try it to see what happens, but they soon learn that it's not in their interests to press it.

To prevent the key being pressed inadvertently, Philip Baum (aged 12) has designed a simple but effective Break key guard, which earns him £5. It is made from a small piece of card

which fits over the Break key of either the BBC micro or the Electron. Figure 1 is a template and should be drawn up to the dimensions shown and cut from card along the solid lines. Score along the dotted lines, then Sellotape it to form a box shape. The same idea can be used to protect other keys too.

The third method of protection is more drastic, involves a certain amount of soldering experience, and is only possible on the Beeb. When the BBC micro was being designed, the specifications were for a Break key at the back of the machine. It was eventually decided to put it on the keyboard, but provision was made for it to be moved to the back of the computer if so required. On older machines, there is a reset hole at the back of the machine, just to the left of the analogue port (looking from the front). This is missing on newer machines but there is provision for the switch on the circuit board. A push-button must be wired to this switch position on the main circuit

board. This then should act in just the same way as the Break key does, and can be used with the CTRL key for auto-booting discs.

Next it's necessary to disable the Break key itself. This can be done on older machines by cutting the link on the keyboard circuit board shown in figure 2. On newer machines, with the new keyboard, it's not possible to get at the links because of the metal keyboard plate which covers the circuit board – the only way is to cut the track from the Break key that leads to the connector.

Let the

experts find

your faults

I OFTEN receive letters from readers describing a fault on their computer and asking for advice on how to repair it. To give an answer here is very difficult without having the machine to test, as there are often many possible causes.

In many cases the simple answer is to return it to your local computer shop and let them deal with it. In my experience, most faults cost very little to rectify. Reputable computer shops can usually carry out the repairs quickly, and they have the equipment to test the micro. This can end up much cheaper than attempting a repair yourself and risking further damage.

You can help the dealer by providing a written description of the fault, or the circumstances under which it occurs – eg, that random characters appear on the screen after the computer has been on for several hours. That way the service engineer knows he should leave the computer switched on for some time before looking for the fault (the sooner he finds the problem the cheaper the repair bill). Intermittent faults have a habit of only occurring at home, and the computer behaves perfectly when in the computer shop – obviously these are very difficult to trace.

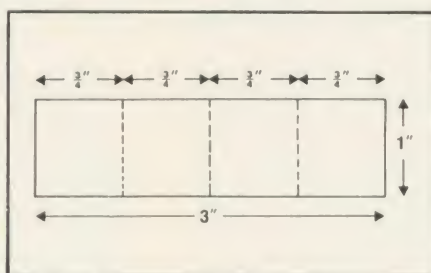


Figure 1. Template for Break key guard

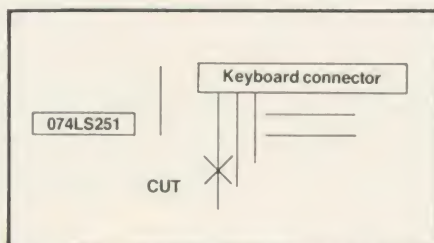


Figure 2. Where to cut the link on the keyboard circuit board

IF YOU have a technical hitch or a programming problem let Martin Phillips give his diagnosis. We'll pay £5 if you raise a really interesting point. Please give full details of the system you're using and include a listing where appropriate, making your question as specific as possible. WRITE TO: Hints & Tips, Acorn User, Redwood Publishing, 68 Long Acre, London WC2E 9JH.



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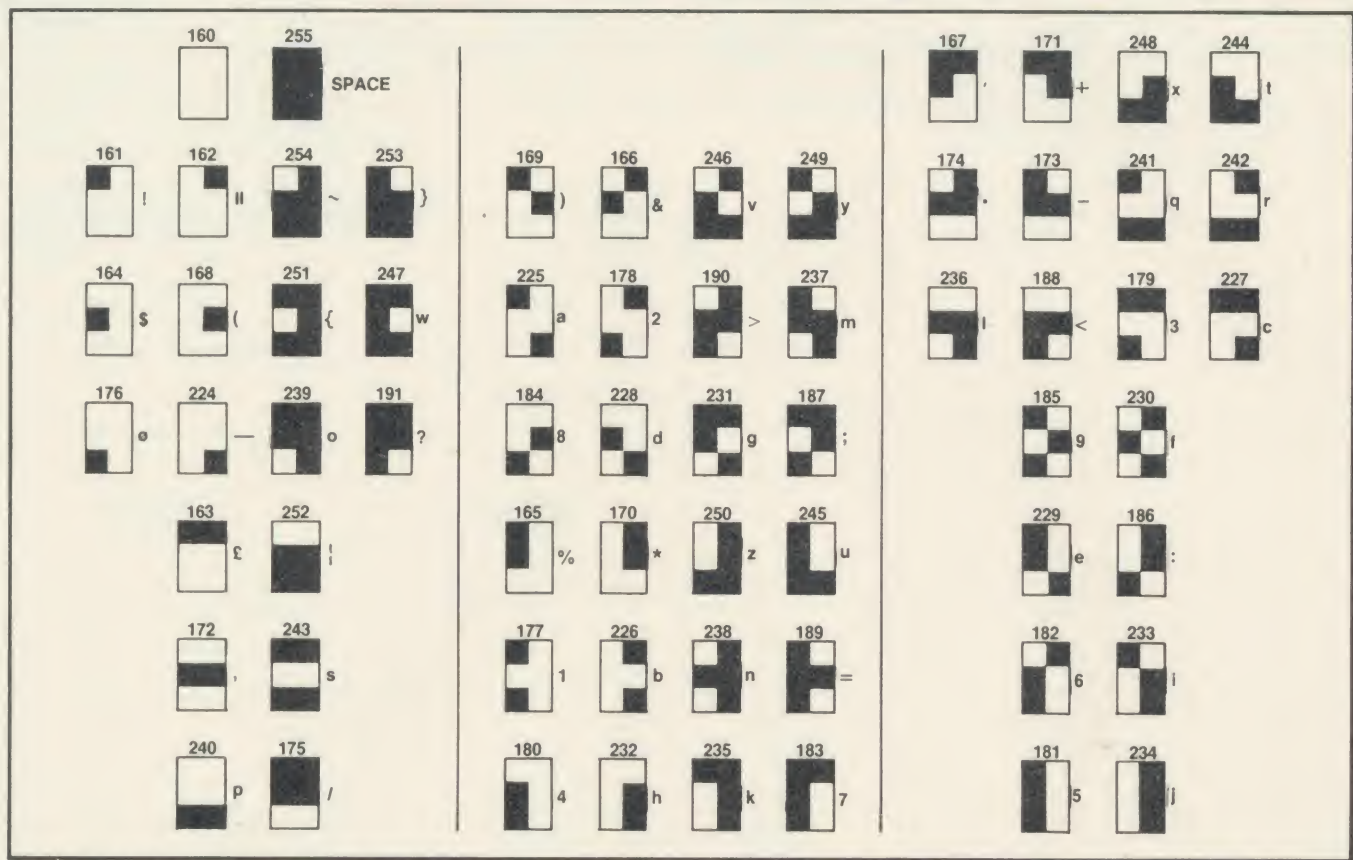


Figure 3. Graphical order layout for the teletext characters

Teletext characters

on show

A USEFUL chart of the BBC's teletext characters wins £5 for D Webb of London. He was prompted to devise the chart after trying to use the one in the BBC User Guide, which is set out in numeric and not graphical order, and uses black for the background and white for the coloured characters. He also found that character 228 was upside down (yet another User Guide bug?).

Mr Webb laid out his teletext character sheet with the following logic:

- 1) Sort characters into groups of '0' cells, '1' cells, '2' cells, etc.
- 2) Pair each shape with its partner if it has one, ie, left-hand and right-hand.
- 3) Pair these shapes with their inverse partner, eg, black cell for white cell.
- 4) Arrange with top left-hand cell starting in the top left-hand corner.
- 5) Number so that black cell represents actual screen pixel shaded.

If all this seems rather complicated, then look at the chart (figure 3). It really is far easier to find which number refers to a particular character.

The teletext characters can easily be entered from the keyboard. First press CTRL together with a function key.

- f1 gives red graphics
- f2 gives green graphics
- f3 gives yellow graphics
- f4 gives blue graphics
- f5 gives magenta graphics
- f6 gives cyan graphics
- f7 gives white graphics

Pressing any of the keys shown on the chart will give the appropriate teletext character. These can be included in programs by enclosing them and the function key code inside speech marks after a PRINT statement. They can also be put after a REM statement provided it, too, is enclosed by speech marks. Do be careful if using this technique in listings you intend to print out, for these teletext codes do funny things to the printer and have to be filtered out using the *FX6 call. Even so, the printer will not be able to display these codes.

Listing 2 allows you to view all these codes. It is a short routine which will display each of the codes in turn plus the ASCII number. The codes are displayed in green, but can be changed by altering the CHR\$(146) in line 30:

- CHR\$(145) gives red graphics
- CHR\$(146) gives green graphics
- CHR\$(147) gives yellow graphics
- CHR\$(148) gives blue graphics
- CHR\$(149) gives magenta graphics
- CHR\$(150) gives cyan graphics
- CHR\$(151) gives white graphics

Note that ASCII codes 192 to 223 do not produce graphics characters. If required, these can be filtered out of the above listing by inserting another line, eg:

```
25 IF N > 191 AND N < 224 THEN
GOTO 50
```

No filing system,

no application

IN FEBRUARY's Hints and Tips, I published a procedure for determining the current filing system, and asked how it was possible to select no filing system.

C J Davies from Hove in Sussex has written a short routine (listing 3) to produce a dummy filing system that will then give a 'no filing system' error if any filing system command is given.

The program works by calling OSFSC with A=6 to warn the current vector owner that it is no longer in control, then setting up the vectors to the dummy filing system, and lastly issuing ROM service call &0F to warn other ROMs of the vector change.

Please don't write in to ask for applications for this program! The only possible one I can think of is as some form of protection against copying, but even this is doubtful.

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What's the difference

between Basic 1

and Basic 2?

THERE are two versions of the Basic language available for the BBC micro – Basic 1 and Basic 2. It's easy to tell them apart – as soon as the computer is switched on type REPORT and press Return. A copyright notice will be printed out; if the year is 1981, then it is Basic 1, and if it's 1982 then the version is Basic 2. The Electron is only supplied with the Basic 2.

Although there are many BBC micros with Basic 1, a lot of people are writing programs on a machine with Basic 2 and not checking that they work on Basic 1. The unfortunate person with Basic 1 finds that the program will not work because the author has used some feature of Basic 2 that either is not present in Basic 1 or does not work correctly.

My 'Black Book' of publishers who have committed this error is rapidly growing, and includes some surprising names – publishers one would have expected to test their programs under all conditions. Even the national MEP has committed this error in recent software it has distributed.

My own machine has both Basic 1 and Basic 2, and I can easily switch between the two using the *FX142 call. The parameter following the *FX142 is the ROM socket number of the version of Basic to be selected. I have placed them in the ROM sockets so that Basic 1 is selected by default. That way all my programs are tested on Basic 1, and I am able to give special Basic 2 versions where appropriate.

Many readers with Basic 1 will be wondering if it's worth buying the new version. Unlike the newer operating system, which was sold quite cheaply, it's expensive to purchase Basic 2 – mine cost about £40. There are only a couple of bugs to be cured, and several new commands have been introduced. Because of the number of computers which were supplied with Basic 1, I feel it's unlikely we'll reach the point where owners are expected to have upgraded their machines to the new Basic, in the same way as was expected with the old 0.1 operating system.

What are the differences to be found in Basic 2? INSTR works even if the second string is longer than the first; ON...GOTO and ON...GOSUB can be followed by ELSE without a byte being left on the stack; several improvements were made to the error messages; the

SIN, COS and LN functions were completely recoded to make them more accurate; the binary to decimal string conversion routines used for PRINT and STR\$ were changed to allow up to 10 figures of precision on printing.

A new statement, OSCLI, was introduced, and four new operations were made available in the assembler – EQUB, EQUW, EQUQ and EQUUS. A new statement (OPENUP) was introduced which had the same token as OPENIN, and OPENIN was given a new token value.

None of these changes is very significant but some can create problems if the program is then to be run using Basic 1. Obviously, EQUB, EQUW, EQUQ and EQUUS should be avoided completely, as should OSCLI. The ON...GOTO...ELSE or ON...GOSUB...ELSE bug is best avoided by not using that syntax.

The INSTR bug, however, can be annoying. It causes unpredictable results when the second string is longer than the first. This can be avoided by always using INSTR in a function:

```
DEF FNinstr(a$,b$)
IF LEN(b$)>LEN(a$) THEN =0
=INSTR(a$,b$)
```

Quickfire

questions

PROBLEMS trying to insert fan-fold paper into a printer? Then don't insert the end of the paper, fold it at the first perforation and then insert it into the printer. The fold makes a strong, clean edge with less risk of tears and jamming, and once threaded, the surplus paper can be rewound.

TAKE THE cover off the BBC now and then (unplug it first) and you will be amazed at the dirt that collects under the keyboard. Clean between the keys with a clean new paintbrush. Unfortunately this is not so easy to do with the Electron, as the keyboard is fastened to the top part of the case, so I'd advise Electron owners not to open up the machine unless it's absolutely necessary.

IF A function key needs to be recalled, type AUTO and press Return, then press the function key and its contents will appear as a program line (or as a series of program lines). If in the middle of a program then start the AUTO line number off at a high line number and delete when finished with.

This will work with Basic 1 or Basic 2. Similarly, the very useful OSCLI which is not available on Basic 1 can be implemented by using a short procedure:

```
DEF PROCoscli(a$)
DIM A 20
$A=a$
X%=A MOD 256
Y%=A DIV 256
CALL &FFF7
ENDPROC
```

This procedure will also work with Basic 1 and Basic 2, although it's rather clumsy. It's not good programming to put the DIM statement in the procedure – it's best put at the start of the program. The DIM space, in this case 20, can be varied to suit the expected length of the OSCLI string.

A different way of doing this, avoiding the use of the DIM statement, is to specify the memory start location for the string. The following example uses locations &900 on. Note that it's not possible to use zero page locations here.

```
DEF PROCoscli(a$)
A=&900:$A=a$:X%=0:Y%=9
CALL &FFF7:ENDPROC
```

The other main problem Basic 1 users will find when typing in listings is that they get an error message at a line containing OPENUP. This should be changed to OPENIN for the program to work correctly.

Disc full

message bug

MY PLEA for help with a 'Disc full' message in February's issue had only two replies – from C Sherin and B Beeston – indicating that this is a very obscure fault. There would appear to be two problems: one in the Watford DFS, and the other in the disc drive itself. Mr Sherin managed to cure a similar fault by having his disc drive realigned.

Why the 'Disc full' message? This is a minor bug in the DFS, I believe. I have got this error message when doing a *BACKUP using a twin switchable drive. It appears if one tries to backup from one format to another, eg, 40 track to 80 track (which is not possible). It seems that perhaps this error message is called at an inappropriate time.

You'll find Hints and Tips listings 1 and 2 on yellow page 97

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LOOP THE LOOP

Tessie Revivis discusses one of the key issues for understanding and writing successful programs

ONE AREA where computers excel is their ability to perform repetitive tasks simply and quickly. For example, when your micro is switched on and you think it's just sitting there waiting for you to type a command in, it's actually executing an incredibly fast program that is repeating an endless stream of loops. Consider just what the program does; it looks at the keyboard, it displays characters on the screen, it flashes the cursor and so on – you can almost imagine that there are a thousand leprechauns running around inside with buckets of information.

Program loops are an extremely important facet of learning to program correctly, and there are two different types available on the Electron and BBC micro. First there is the FOR...NEXT loop – this is used when we

know the number of times we wish that particular loop to be repeated. The second type is the REPEAT...UNTIL loop – this is used to repeat a loop until a certain condition is met. FOR...NEXT loops are probably the most common so I'll examine these first.

Suppose we wanted to print a list of numbers from 1 to 1,000,000. The hard way would be to write a program with a million lines, each printing a single number – obviously ludicrous and time-consuming. Utilising a FOR...NEXT loop, the whole program takes just three short lines:

```
10 FOR N% = 1 TO 1000000
20 PRINT N%
30 NEXT N%
```

Value of @% to Format 2 with 5 decimal places to a field width of 8 places

The FOR and NEXT commands are called the entry and exit positions, and as you can see, they are at opposite ends of the program. Because we want to perform the loop one million times we need to keep a record of the current count values. To do this we can use a variable, N% in this instance. You can use any variable you like but it's good to get into the habit of using the same variable to perform the same function wherever possible. This helps to ensure that your program is error-free, and makes the program easier for you to write and follow. I always use N% and L% to act as number and loop counts respectively. Avoid using the letters I and O as variables such as I% or O% because they can be confused with ones and noughts.

The counting program begins by

page 46 ►

defining the range of N%, which starts at 1 and goes on to 1000000. Line 20 prints the current value of N%, and finally line 30 says do the NEXT value of N%—this effectively increments the value of N% by 1. When N% reaches its maximum prescribed value the loop is completed. The program in this instance would finish but if it formed part of a bigger program it would continue with the next line.

This loop has limitations in that it only goes up or increments in steps of one. How would we go about printing the even numbers between 0 and 100? One answer would be to add an extra one to the loop variable within the FOR ... NEXT loop itself:

```
10 FOR N% = 0 TO 100
20 PRINT N%
30 N% = N% + 1
40 NEXT N%
```

Line 30 adds one to the current value of N%. Remember that the loop itself adds one to N%, giving us the step size of two. This method is clumsy, though, and an extra statement can be added to the FOR ... NEXT combination to specify the exact step size. This keyword is STEP and is inserted at the end of the FOR line. Our even numbers program would become:

```
10 FOR N% = 0 TO 100 STEP 2
20 PRINT N%
30 NEXT N%
```

Much neater, you'll agree. See if you can modify this program to print the numbers from 25 to 75 in steps of five. We can also get FOR ... NEXT loops to work in reverse (to count backwards if you like), by reversing the order of the loop control variable parameters and specifying a negative step size. The following program counts from 100 down to 1:

```
10 FOR N% = 100 TO 1 STEP - 1
20 PRINT N%
30 NEXT N%
```

Here the entry value is 100, the exit value is 1 and the step size is - 1. What would happen if we left out the STEP size in this program?

The second type of loop is REPEAT ... UNTIL. This does not require a variable to work on but has to test for a certain condition being met. The loop will repeat continuously until that condition is met.

We could translate our one to one million counting program as follows:

```
10 N% = 0
20 REPEAT
30 N% = N% + 1
40 PRINT N%
50 UNTIL N% = 1000000
```

The immediate thing to note here is that

```
10 FOR A%=1 TO 100
20   FOR B%=1 TO 100
30     FOR C%=1 TO 100
40       FOR D%=1 TO 100
50       NEXT D%
60     NEXT C%
70   NEXT B%
80 NEXT A%
```

Figure 1. If FOR ... NEXT loops are nested inside each other, they must be symmetrical

the program is longer, twice as long in fact, so it's not very efficient when used as a counting loop. The reason is that the program itself must take into account, and remember to increment, the loop control variable. First line 10 sets N% equal to nought. Then it enters the loop, increments N% by one prior to printing its value. Finally it tests to see if N% is equal to one million.

REPEAT ... UNTIL loops are much more useful in testing for non-counting conditions. Suppose we wanted to detect and display a key pressed at the keyboard and continue doing so until the Q key was pressed. Using a REPEAT ... UNTIL loop makes this task simplicity itself:

```
10 REPEAT
20 C$ = GET$
30 PRINT C$
40 UNTIL C$ = "Q"
```

Run the program, and press any of the alphanumeric keys. They are displayed until you press the Q key. The UNTIL condition in the loop at line 40 has now been fulfilled so the loop is exited. The condition you test for in the UNTIL statement can be almost anything that can be evaluated by the program. You can even make a program repeat forever (well, until Escape or Break are pressed) by changing line 40 to read:

```
40 UNTIL FALSE
```

Loops may also enclose loops. In other words it's quite permissible to place a loop inside a loop, a technique known as 'loop nesting'. Two REPEAT ... UNTIL loops can provide the basis for a number guessing game:

```
10 REM Number Guessing
20 REPEAT
30 R% = RND (9) + 49
40 REPEAT
50 PRINT "Guess a number ";
60 G% = GET
70 IF G% < > R% PRINT "Wrong!"
80 UNTIL G% = R%
90 PRINT "Correct, well done!"
100 REM Press a key to continue
110 K% = GET
120 UNTIL FALSE
```

You should be able to see the two loops. The outer loop is the overall con-

trol loop, in this case it just ensures that the program repeats when finished(!). The inner loop is responsible for playing the game and continues asking you to guess until you get it right.

FOR ... NEXT loops may also be embedded with REPEAT ... UNTIL loops and vice versa. Similarly FOR ... NEXT loops may be nested inside each other, but care must be exercised here. Look at the following program—what's wrong with it?

```
10 REM Nested loops
20 FOR N% = 0 TO 100
30 PRINT N%
40 FOR L% = 1 TO 99
50 PRINT "L% = ":L%
60 NEXT N%
70 NEXT L%
```

Have you spotted the mistake? The NEXT variables are the wrong way round. If you run this program you will get an error message. FOR ... NEXT loops nested within one another must be symmetrical: a FOR must always have a matching NEXT, as figure 1 shows.

Another downfall is trying to jump out of loops before they have fulfilled their potential, as this awful example shows:

```
10 FOR N% = 1 TO 100
20 IF N% = 50 THEN GO TO 50
30 NEXT N%
40 END
50 PRINT "N% = 50"
```

Here the loop will never be completed and this will leave the computer in a very confused state of mind. If your program was of any length this would almost certainly cause it to crash at some stage. If you must jump out of a loop do so by fulfilling the exit condition. The above program could be rewritten to ensure a smooth run thus:

```
10 FOR N% = 1 TO 100
20 IF N% = 50 THEN N% = 100
30 NEXT N%
40 PRINT "N% = 50"
```

Here, although the FOR ... NEXT loop only goes from 1 to 50 the computer is fooled into thinking it has completed it 100 times and remains happy.



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Type	Ribbons	Dust Covers
MX100/FX100	£10.00	£5.25
FX80/MX80	£4.75	£4.95
RX80	£4.75	£4.50
GP80	£4.50	—
GP100	£4.95	£3.95
GP250	£5.95	£3.95
KAGA KP810	£5.95	£4.75
CANON PW1080	£5.95	£4.75
MICROVITEC MONITORS	—	£5.50

4 COLOUR PLOTTER PRINTER

SAKATA SCP-800 printer/plotter facilitates
plotting & printing in 4 colours on paper upto A4
size, using easily replaced pens. In text mode it
prints upto 12 CPS. Max 160 Char. per line. In
graphics mode it offers full plotting facilities incl.
drawing, moving, scaling of text, rotation &
drawing of axes. (Write for a sample printout).

Only **£175**

Set of 4 SPARE PENS
only **£3.95**

PRINTER SHARER

Allows 3 BBC Micros to be connected to one
Printer.

Only: **£65**

BROTHER HR-15 DAISY-WHEEL PRINTER

Brother HR15 is a high-quality daisy-wheel ideal
for a budget printer for serious use. Notable
features of this printer include a 3k buffer, 18cps
(max), bi-directional printing, proportional
spacing, Centronics or RS232 interfaces as
standard, optional sheet feeder and an optional
keyboard.

With immediate effect, we are offering at
no extra cost ON-SITE 12 months
Maintenance on all HR15 Printers purchased
from WATFORD on or after March 1985.
W.E. GIVES YOU A GREAT DEAL

ONLY **£325** (carr. £7)

Single Sheet Feeder	£195
Electronic KEYBOARD	£135
TRACTOR FEED Attachment	£90
RIBBON CARTRIDGES:	
Fabric £3.75 ; Carbon £3.75 ;	
Multistrike £6	
DAISYWHEELS (various typefaces)	£18

Listing Paper (Perforated)

1,000 Sheets 9½" Fanfold Paper	£7
2,000 Sheets 9½" Fanfold Paper	£13
1,000 Sheets 15" Fanfold Paper	£9
Teletypewriter Roll (Econo paper)	£4

Carriage on 1,000 Sheets **£1.50**

PRINTER LABELS

(On continuous fanfold backing
sheet)

1,000 90×36mm	£5.00
1,000 90×49mm	£7.75
1,000 102×36mm	£6.25

Carriage on 1,000 Labels **£1.00**

All prices exclude VAT

SPECIAL OFFER

HITACHI EPROMs for Sideways ROMs
2764-250nS £3.99
27128-250nS £8.99

RAMs (Low power) for ATPL, WATFORD, etc.,
Sideways ROM Boards

6116LP (2K) £3.10
6264LP (8K) £9.25

(Maximum of 5 ROMs or RAMs of any one type
per order). Dealers inquiry welcome.

KAGA KP810 NLQ PRINTER

This new Japanese printer has EPSON FX/RX
compatible control codes and is functionally
equivalent to an FX80 with the added advantage
of its 'Near Letter Quality' mode. It is solidly built
and features include: Normal, Italic, Enlarged,
super/subscript, proportional spacing and
user-defined character set. Extras over the FX80
included in the price are Near Letter Quality
(NLQ) print ideal for correspondence. Proper
adjustable tractor feed, half speed quiet mode
and 3K buffer. The printer is bi-directional and
logic seeking to give a speed of 140CPS for high
throughput in conjunction with the standard 3K
buffer. 8K RAM may be added to give more
user-defined character sets. Centronics parallel
interface + Watford's 12 month NO QUIBBLE
WARRANTY.

Special Offer: ONLY **£252** (£7 carr.)

RS232 interface + 2K buffer to connect to other
micros.

£89

EPSON HI-80 PLOTTER

The latest addition to the popular range of
EPSON Printers/Plotters. Prints in upto 10
colours. Has many more features. Please write in
for spec sheet.

Price: Only **£399** (£7 carr.)

KAGA KP910 Printer

Similar to the KP810 but with 17" carriage for
wide print. Gives 156 columns of normal print or
256 columns in condensed mode. Ideal for
printing out spreadsheets.

ONLY **£339** (£7 carr.)

PRINTER LEAD

Centronics lead to connect BBC micro to
EPSON, KAGA, SEIKOSHA, NEC, STAR, JUKI,
BROTHER, SHINWA etc. printers.

Standard length (4 feet long)
Extra long (6 feet long)

£7
£9

Continued



THE ULTIMATE DFSs for the BBC MICRO

Watford are proud to be able to supply both SINGLE and DOUBLE DENSITY versions of their highly acclaimed Acorn compatible DISC FILING SYSTEM.

THE FEATURES OF WATFORD'S SINGLE & DOUBLE DENSITY DFS.

- The system allows standard Acorn's 31 files or 62 files per disc side.
- Built-in formatting program.
- Built-in Disc VERIFIER.
- Built-in SECTOR EDITOR.
- Double step mode allows use of 40 or 80 track Discs on 80 track drives. (software switchable).
- A WORKFILE function allows a program to be edited and repeatedly saved having only typed its name once.
- Allows use of AMBIGUOUS filenames.
- Two commands exist to allow transfer of programs from tape to disc.
- An Advanced COPY COMMAND is included.
- RENAME has been extended to allow the use of ambiguous filenames.
- An improved OPENOUT command.
- A SPACE command informs you of the space left on the disc.
- 2K of RAM can be reclaimed from the DFS by setting "PAGE" to &1100.
- The *CAT command automatically utilises the full width of an 80 column screen where available.
- FULLY COMPATIBLE WITH TELETEXT, TORCH and both ACORN 2nd PROCESSORS.
- Disc prepared on ACORN DFS can be both read & written to on WATFORD's DFS & vice versa.

Please write-in for further detail technical specifications.

What do the independent press say?

"Good value for money" - Beebug
 "A very worthwhile package" - The Micro User
 "You'll be buying a very powerful package" - Personal Computer News
 "Superior DFS: Excellent disc sector editor" - Computer Answers

Without a doubt the most sophisticated DFS software yet written for the BBC microcomputer. This powerful DFS is fully compatible with the ACORN DFS, yet has much increased power due to the additions, carefully designed to make life easier in normal use. It consists of 16K of efficiently written machine code. It is entirely self contained and so does not require a utilities disc to function.

SINGLE DENSITY INTERFACE PRICES

- DFS (Disc Filing System) ROM **£18**
- Complete Disc Interface Kit **£89**
- Incl. DFS ROM & fitting instructions
- Acorn's DFS Kit complete **£86**
- DFS Manual (comprehensive) **£6.95**

(Our DFS Manual is suitable for both versions of Watford's DFSs and the Acorn DFS)

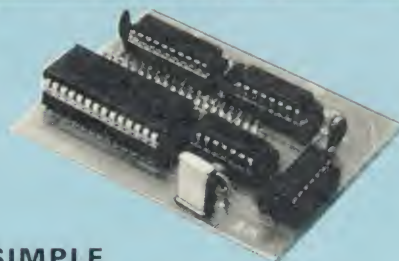
- We will exchange your existing Acorn DFS for Watford's ULTIMATE DFS for **£14**
- Please note that this is FULLY Acorn DFS compatible and runs, without exception, all products tested, including Elite.

Watford's DFS is exclusively available from Watford Electronics. We DO NOT retail this product through dealers. Every ROM carries a printed label with our LOGO and a serial number.



**ACCESS
HOT LINE
(0923 50234)
24 Hours**

WATFORD'S ULTIMATE DOUBLE DENSITY DFS



SIMPLE but SOPHISTICATED

We are proud to bring to you the Watford Electronics Double Density Board for the BBC Micro.

The DDFS supplied is a new version of the popular Watford Electronics DFS re-written to make full use of the capabilities of the new double density controller.

We are proud to announce that our double density now runs all known versions of Acornsoft's best-selling game Elite. DDFS also runs Hi-View, Fortress, Aviator, Castle Quest, etc.

- Increases storage capacity of your Disc Drives by the maximum physically possible, **80% !!!**
- Our system will use the whole of an 80 track drive. Inferior systems do not allow files longer than &3FFFF bytes, but with our system files can be as long as one disc side.
- Discs may be created in either single or double density format with the built in formatter and in single density mode are fully compatible with normal Acorn format discs.
- The density of the disc you put in is automatically sensed by the system and you are informed of the density in the catalogue display.
- Copying of files between single and double density discs is automatically catered for.
- The double density system is of course faster than single density.

NOW Our 8271 emulator has been extended to cope with illegal sector IDs.

The Watford Electronics DDFS implements an extremely comprehensive 8271 emulator so that commands passed through OSWORD & 7F are correctly interpreted. Other manufacturers thought that read and write sector alone were sufficient - we decided to implement every command of the 8271 that was physically possible. We have allowed the use of all the special registers including bad tracks, allowed access to deleted data etc., etc. The emulator itself takes up around 1K of compactly written machine code. We reckon it will run many of the protected discs now available. Gain all the advantages of the WE DFS together with much increased storage and compatibility with many existing protected discs.

(please write-in for full technical specifications)

Complete Double Density Disc Interface **£85**

DDFS Manual **£6.95** (no VAT)

We will exchange your existing Single Density Interface for our DDFS Unit for **£45** (Carriage £1.50)

3M - 5 $\frac{1}{4}$ " DISKETTES

Top quality 3M - SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick, disc labels and write protect tabs.

DON'T SETTLE FOR LESS, BUY THE BEST

- 10 x S/S D/D 40 Track Diskettes **£13**
- 10 x D/S D/D 40 Track Diskettes **£18**
- 10 x S/S D/D 80 Track Diskettes **£22**
- 10 x D/S D/D 80 Track Diskettes **£24**

FREE with every pack of 10 x 3M Discs this most useful "Post-It" NOTE PAD & TRAY PACK.

MYSTERIES OF DISC DRIVES & DFS REVEALED

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive? What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin? What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford Electronic's new book entitled 'MYSTERIES OF DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

There is even a handy section describing the phrases you are likely to encounter, and how to interpret them. This book must be an essential purchase at £5.95, especially if you own or are thinking of buying a disc system.

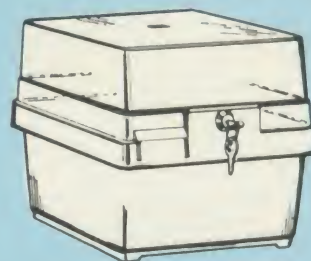
£5.95 (Book No VAT)

DISC ALBUMS

Attractively finished in beige leather-look vinyl, these conveniently store upto 20 Discs. Each Disc can easily be seen through the clear view pockets.

£4.25

LOCKABLE DISK STORAGE UNITS



Strong plastic cases that afford real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

M35 holds upto 40 discs **£12**

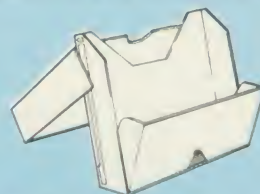
M85 holds upto 95 discs **£15**

FLOPPY HEAD CLEANER KIT

The heads in a floppy disc drive are precision made and very sensitive to dirt. Drive manufacturers recommend that you clean the heads approximately once a week. Unless your home or office is dust free one of these kits is a very sensible precaution against losing valuable data. A dirty head can destroy many disks before you realise the trouble. Very simple to use.

Only £9

PLASTIC LIBRARY CASES



for Disc Storage 5 $\frac{1}{4}$ " (holds 10) **£1.80**

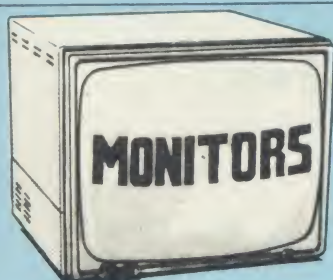
BBC MICRO WORD-PROCESSING PACKAGE

A complete word-processing package (which can be heavily modified to your requirements, maintaining the large discount). We supply everything you need to get a BBC micro running as a word-processor. Please call in for a demonstration.

EXAMPLE PACKAGE

BBC Model B, Watford Electronics' DFS upgrade, WORDWISE ROM, Twin 200k Epson drives in beige, Zenith 12" Hi-resolution monitor (Green or Amber), Brother HR15 daisywheel printer, Gemini software: BEEBCALC spreadsheet, analysis and DATABASE software on disc, 10 x 3M disc, 500 sheets fan-fold paper, 4 way mains trailing socket, manuals, all leads and BBC carrying case.

NEW LOW PRICE
Only £1,089



We stock a range of monitors to suit all needs. Choice of a monitor is a matter of personal taste so we recommend that whenever possible, you ask for a demonstration at our shop.

MICROVITEC

- 1431 - Medium resolution as used on the BBC television computer programme £165
- 1451 - High resolution, suitable for word processing in mode 0 £237
- 1441 - High res, exceeds the capabilities of the BBC micro £385
- 1431AP RGB + PAL and AUDIO £199
- 1451AP RGB + PAL and AUDIO £285
- Dust Cover for Microvitecs £5.50

All Microvitec Monitors are 14" RGB in their distinctive right angle sturdy metal case or the new beige plastic case. They are supplied complete with connecting lead to the BBC and a 3pin mains plug.

KAGA

- KAGA Vision 2 High Res. Colour £225
- KAGA Vision 3 Super High resolution, Colour £310

Kaga Monitors are 12" RGB colour units housed in an attractive beige plastic cabinet. They all have as standard, a genuine etched anti-glare screen.

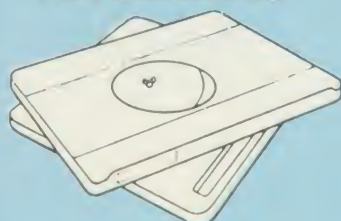
ZENITH

12" Ultra high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. The high resolution makes it good for games too - you can really see the detail that has been put into the graphics ONLY £66

LEADS

- BNC Lead for Zenith or Philips £3
- RGB lead for KAGA £5
- N.B. Carriage on Monitors £7 (securicor)

SWIVEL BASE FOR MONITORS



Only £15

DISC DRIVES PRICES SLASHED

(ALL DRIVES NEW
SLIM-LINE)



(DRIVES Cased with Cables. No PSU. Connects directly to the BBC's power socket.)

- **CLS 100** Single, TEC Single sided 40 track 100K, 5 1/4" Disc Drive £89
- **CLS200** Single EPSON Drive, Double sided 40 track, 200K, 5 1/4" £99
- **CLS400** Single, Mitsubishi/Epson Double sided 80 track 400K, 5 1/4" Disc Drive £126
- **CLS400S** Single, Mitsubishi/Epson Double sided 40/80 track Switchable, 400K, 5 1/4" Disc Drive £135
- **CLD200** TEC Single sided 40 track 200K twin 5 1/4" Drives £165
- **CLD400** Epson, Double sided 40 track 400K, 5 1/4" TWIN Drives £199
- **CLD800** Mitsubishi/Epson Double sided 80 track 800K, 5 1/4" TWIN Drives £235
- **CLD800S** Mitsubishi/Epson Double sided 40/80 track switchable, 800K, Drives £269

DISC DRIVES CASED WITH PSU & CABLES



- **CS100** TEC Single sided 40 track 100K 5 1/4" Single Disc Drive £119
 - **CS200** Epson Double sided 40 track 200K 5 1/4" Single Disc Drive £139
 - **CS400S** Mitsubishi/Epson Double sided 80 track 400K 5 1/4" Single Drive £149
 - **CD200** TEC Single sided 40 track 200K 5 1/4" TWIN Disc Drives £205
 - **CD400** EPSON Double sided 40 track 400K 5 1/4" TWIN Disc Drives £215
 - **CD800** Mitsubishi Double sided 80 track 800K 5 1/4" TWIN Drives £295
 - **CD800S** Mitsubishi Double sided 40/80 track Switchable 800K TWIN Drives £299
 - DFS Manual (comprehensive) £7 (No VAT)
 - TWIN Disc Drive CASE with Power Supply to house your own Drives £38
- N.B. All single Drives with Power Supply will be supplied in a twin Case for later inclusion of a second Drive.

(Carriage on Disc Drives £7 securicor)

P.S.

- You do not require a formatting Disc nor the expensive 40/80 track switchable Drives when using Watford's sophisticated Disc Filing System which has this facility as one of the many facilities incorporated in it as standard.

Cont.

● MITSUBISHI & EPSON Slimline 400K Disc Drives that we supply are Double sided Double Density, 1 Megabyte unformatted. (With BBC Micro 400K after formatting). When used in conjunction with our Double Density Interface, you obtain 725K formatted. Track density is 96 TPI, track to track access time is 3mSec. These drives are very fast, quiet and efficient. We strongly recommend them

● Extensive test carried out in our workshop has proved that the BBC Micro's own switchmode power supply is capable of driving 2 disc drives and a host of Sideways ROMs without undue heating. We recommend our CLS & CLD range of Disc Drives which will save you considerable expense without sacrificing performance.

● Please send an SAE, for further technical specification on our Disc Drives.

DUST COVERS

(For our Disc Drives)

- Single (without PSU) £3.20
- Twin (without PSU) £3.85
- Single (with PSU) £3.25
- Twin (with PSU) £3.90
- Twin (side by side with PSU) £3.95

FORTH ROM for BBC

This ROM provides a complete implementation of the FIG-FORTH standard (including editor). Supplied with a large tutorial manual at only £32

TINY PASCAL for BBC Micro £54

NEW
LAUNCH

ROM-SPELL



A ROM based fast spelling checker essential to serious word processing users of the BBC micro.

Compatible with the popular word processors VIEW, WORDWISE and also with *SPOOLED text files. Allows misspelt words to be changed without returning to the word processor. Simply load the text and execute the spelling checker, correcting the words as you go along, or all at once at the end.

An optimised word compacting technique gives a comprehensive 30,000 word dictionary as standard as well as a user defined dictionary for specialist applications. Efficient data storage also means faster operation, text can be checked at 160 words per minute!!! Equivalent to looking a word up in a standard dictionary in well under half a second!

An ambiguous word checking facility allows partially spelt words to be checked against the dictionary and all the matches displayed. This is ideal when you are uncertain of a spelling and a boon for crossword addicts!

Full access to the dictionary from BASIC allows users to check words from within their own programs. Useful for educational programming and also to compilers of word puzzles and anagram solvers. Save time spent looking in dictionaries, use ROMSPELL.

ROMSPELL is supplied on a ROM with the dictionary disc and full instructions for Only:

£25

(Please specify 40 or 80 tracks when ordering)

Continued

THE EPSON RX/FX/KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled **THE EPSON RX/FX/KAGA PRINTER COMMANDS REVEALED**.

This book describes in plain, easy to understand English how to use your printer (Kaga KP810, Canon PW1080A, or any other Epson FX-80 compatible printer) with the BBC micro, both from Basic and your Wordwise wordprocessor.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

This book is superb value at only
£5.95 (Book – No VAT)

EPSON FX/RX NEAR LETTER QUALITY PRINT ROM

EPSON NLQ ROM
for the BBC Micro



Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ1 (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:

- Simply type *NLQ80/100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80); ENLARGED type; UNDERLINED type. These features can be used separately or in any combination.
- Full UK character set; Standard 'pica size'; Proportional spacing; Enlarged, Underlined; Normal type.

The NLQ ROM is incredibly easy to fit and use. Supplied complete with Manual.

Only: £22

VIEW PRINTER DRIVER for NLQ ROM

This specially written printer driver has been designed to allow View access to the full features of our NLQ ROM.

A must for all VIEW and NLQ ROM users

£7.00

DUMPOUT 3 NOW WITH EXTRA FEATURES!



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!

The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.

Two commands are used to operate the dump routines:

*GIMAGE – This provides a full graphics dump of any Mode (including Mode 8). There are many optional parameters but you need only specify the parameters you wish to change.

- V <scale>, H <scale> – These 2 byte numbers give fine control over the size of the dump from minute to enormous. Unlike other dump ROMs, scale works the same in all modes inc. mode 7.
- R <0-3> – Print dump rotated by 0, 90, 180, 270 degrees.
- I <indent> – Set gap from left edge of paper.
- X <min><max>, Y <min><max> – Selects screen area, by default the whole graphics window is dumped.
- P – Dump shows physical colour values.
- G – Grey scale reproduction, dumps otherwise use a negative scale (white prints darkest).
- T Two tone dump for maximum resolution.
- M <mask> – 8 bit colour mask.
- E – Contrast expansion to make mode 7 text and separated graphics stand out clearly from the background.
- C – All mode 7 graphics are printed as contiguous to improve the shading in graphic areas.
- K – Key-triggered dump. The dump does not commence immediately, but can be triggered off later by pressing <SHIFT><0> or <CTRL><ESCAPE>.
- S – Switch-triggered dump. As K, but the trigger is an external switch (not supplied) connected to the user port. The S option can still work with games that corrupt RAM page D.

*TIMAGE <indent> – Does a fast, text only, dump of the contents of the text window in any mode.

*GWINDOW and *TWINDOW – These commands draw the graphics and text windows, respectively, on the screen and allow them to be changed with the cursor keys. Note that GIMAGE and GWINDOW work fully in mode 7. Designed for use with the following printers: CP80, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, LPV7, NEC PC8023, DMP100/120/200/400, etc. etc.

Price including comprehensive manual

£24

VIEW

VIEW WORDPROCESSOR

We are supplying the new VIEW version 2.1 allowing printing of memory contents etc

£46

HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

£49

VIEWSHEET (Acornsoft)

£49

Watford's own Sophisticated VIEW PRINTER DRIVER for Epson FX80 & KAGA KP

To simplify using the full facilities of the Epson FX80 or Kaga KP810 use this printer driver. Full facilities are provided for selecting between fonts etc. The disc includes examples of use and instructions. Available on 40 or 80 track disc (please state which required). **£9**

VIEW DRIVERS FOR JUKI & BROTHER PRINTERS

Only £8

VIEW/VIEW SHEET PRINTER DRIVER for SILVER REED (Officially approved by Silver Reed)

A range of VIEW Printer drivers to complement the Silver Reed range of printers EXP400/500/550 & 770 EB 50 and converted typewriters EX43/44 & 55.

Only: £8

BEEB PRINTER ROM



"Makes Printing Childs Play"

This utility ROM is designed to simplify using all the facilities of your printer. It has many facilities:

★ Selection of printer modes such as underline, font and size is by 'Single Key' operations.

★ From Wordwise, a single number following OC will select a mode rather than a long and incomprehensible string of control codes. This makes using your printer with Wordwise much more convenient.

★ When using Basic (or other languages) you can have control over the formatting of the output to the printer in the style of a wordprocessor. You can define page top, bottom and side margins etc. with intelligent page skip for binders an option. All supported printers will now respond to form-feed etc. commands.

★ User defined characters are printed as you see them on the screen so that non-standard characters are automatically printed out correctly.

★ Commands select the options for the following printers: GP100, STAR, NEC, MX/FX, KAGA, LP/VII/DMP100, DMP200. Operates with either parallel or serial interfaces.

★ Supplied with a 50 page manual that is very comprehensive and easy to follow. Please specify printer type when ordering so that we can send the correct function key strip.

Price: £24

TWO DATABASE MANAGEMENT SYSTEMS



DISCDATA

Discdata is an entirely disc based database handling system. It is extremely easy to use through its comprehensive menu system. The simplicity is such that we do not feel the need to provide explanation on use in the written guidance supplied with the program. The first-time database user will rapidly become familiar with this package designed throughout to be simple and obvious.

Despite the ease of use this system provides all the facilities needed for complex data handling problems. The length of database that can be handled is only limited by the total space on the disc. You can have up to 20 fields with page length records up to 254 bytes in length. Adding and deleting records, amend titles, field names and records. Sort on any field and search for any record or group of records in any field. The database may be re-formatted after creation, the system will re-write all your files for you automatically. You may add extra fields and extend the length of existing fields freely.

Output formatting is very powerful. You are allowed 40, 80 or 132 column output modes going to printer or screen. Selected fields can be put in any order on the screen or printer, either across the paper or down. Output can start or stop anywhere in the file. Decimal fields are automatically totalled and records output are counted. Version 2, now on sale has improved input and amendments procedures giving full record edit as well as the 3 extra features... String searching. Calculations on numeric fields, and the ability to create sub files from your main files.

On disc at **Only £17**
(Please specify 40 or 80 track when ordering)

FILE-PLUS

The File-Plus package is even more powerful and flexible than Disc-Data. It is also largely menu driven but has its own command language for file searching. The 16K ROM contains all the normally required routines, with lesser used options supplied on the utilities disc. All input and output formatting is controlled through screen forms. A full screen editing system is used to define a form which allows tremendous flexibility in the format in which your data is displayed. It is very easy to change from form to form so that you can type in your data with one form, and examine it with others. You will typically design several forms before starting to access the database so that you can quickly and easily see the fields of each record that you want to appear in the layout you decide on. The form system is also used for output to your printer.

File Plus has a unique file linking system that allows the entire on-line storage of your system to be used for one database. This can give around 1.5 Megabyte databases using dual drives and double density.

The built in FQL (File-Plus Query Language) can be used for searching the database. Presented in the form of a powerful command language with looping facilities etc. this allows the most flexible access to your data possible. Full arithmetic operations are provided to allow the system to be used for statistical analysis.

Cont.

Operations supported are —, +, *, /, +—999999 9999.9999 and compare facilities =, >, <, >=, <=, < & .

Many keywords are supported by the language: assign, compare, display, and, goto, iff, ift, print, read, search, spool and update.

Supplied with a very detailed 70 page manual to explain all the facilities with many examples.

Only £43

(Please specify 40 or 80 tracks for the utilities disc)

DATAGEM

Gemini's 24K ROM based DATABASE Management System

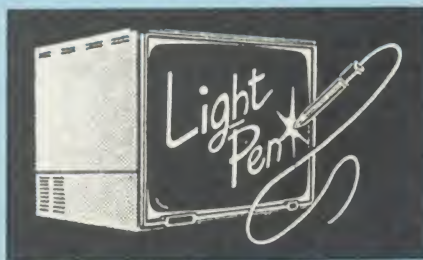
Special Offer: **£105**

PEN PAL - VERSATILE LIGHT PEN SOFTWARE

Do you have a light pen that never gets used? Then this piece of software is for you. This package offers many useful facilities that make the light pen a useful device to own. Facilities included are:

- Pixel, Line and Character definition
 - Free hand drawing
 - All Colours
 - Fill, Refill and stripes
 - User defined "Brush strokes" plus character definer
 - Grid, Scale and perspective aids 2 to 200 points palletable in one design with Circles and "rubber banding"
 - Move design/character to any screen position
 - Save and Load screens. User defined characters and line drawings for video titles, own programmes etc.
- This program has many uses in education and at home. It is supplied with a comprehensive instruction manual.
- Works with Watford, RH, Acorn User, DIY and many other Light Pens.
- Prices TAPE **£11**; DISC **£12**

LIGHT PEN



This Light Pen for the BBC micro is packaged in a neat pen shape with built in switch. Supplied complete with our sophisticated Pen-Pal software on cassette (see elsewhere in this ad).

Only £23

(For software on disc please add £2)

DISC EXECUTOR

Disc Executor is a sophisticated disc utility for the transfer of your programs from cassette to disc. It copes with 'locked' files and full length adventures (up to 86E blocks long) and programs that load below &E00. Disc Executor is simple to use and provides menus to prompt the user along the way. Disc Executor will cope with the vast majority of tapes. (Please note that Disc Executor is not compatible with double density disc interfaces — keep reading our adverts though!)

Price only £10

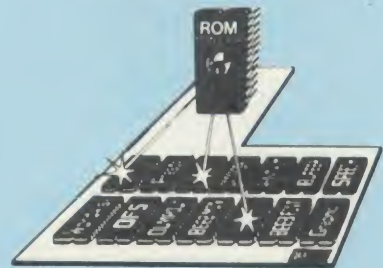
(Please specify whether 40 or 80 track disc when ordering)

ADE

Systems complete program development package in a 16K ROM. Full assembling and debugging facilities provided. We are now supplying the new 6502 2nd processor compatible version

SPECIAL OFFER ONLY £43

ROM MANAGER



Provides comprehensive management of all your installed ROMs — BEEBUG Nov. '84.

This ROM is unique in its capabilities. It allows you, the user, full control over the BBC Micro's sideways ROM paging system with simple to use commands. This ROM is essential for those with several ROMs. At a simple level ROM MANAGER can be used to remove the problem of clashing command names and allow full use of all the facilities of your ROMs. This is coupled with facilities to completely enable or disable various ROMs in the machine including ROM manager itself.

ROM MANAGER can also be used to develop sideways ROMs using the machine's standard memory. This is achieved by sending sideways ROM calls to your code in RAM, saving the expense of fitting sideways RAM for ROM development purposes. ROM status reports are also given by the ROM, including ROM lengths, checksums, entry points supported and current filing system title.

The ROM also provides facilities to examine ROMs, list function keys for editing, modify RAM (using a HEX/ASCII editor) and list ROM titles neatly and concisely.

All selection between particular ROMs is by the name of the ROM and this may be abbreviated for convenience. ROM numbers can also be used if required. This ROM is very simple and obvious to use. All the facilities are explained in the clear and detailed manual.

Price £22

BUFFER & BACKUP ROM

For those with sideways RAM fitted in their machines this utility ROM will make full use of this facility. By using the sideways RAM area for extra memory the following features are implemented:

- ★ 4K or 16K buffer for parallel printer.
- ★ Dumps selection of Disc files to Tape.
- ★ Makes backup copies of tapes on to tape and disc.
- ★ Displays contents of paged ROMs on screen.
- ★ Menu display of ROM filing system contents on Shift-Break.
- ★ Comprehensive manual.

Only £22

ULTRACALC 2

The mark 2 version of the BBC Publications extremely popular electronic spreadsheet ROM. Features include: Simple communication with program, with many prompting messages; Full range of editing commands; Efficient memory usage, allowing large spreadsheets to be constructed; The handling of labels, as well as numbers, as values; Individual variations of the width of columns; Display available in all screen modes; Operates as HICALC on 6502 2nd processor giving 44k of workspace; Flexible printer controls.

Only: £66

Continued

BEEB MON



Watford's own Machine code Monitor ROM written by Andrew Bray (Cambridge), co-author of the BBC Micro Advance User Guide.

The most powerful and versatile machine code monitor ROM yet written for BBC Micro. It has all the normal memory editing, moving and relocating facilities, plus all editing is with a full screen editor allowing scrolling up and down memory, entering in Hex, ASCII or standard assembler mnemonics. In use as a debugging tool, you run code under a total emulation system. Ever felt a desperate urge to set a break point in ROM? No problem - you can even have breakpoint on reading or writing locations in memory and on register contents. The system fully supports debugging of sideways ROMs e.g. BASIC can fully and easily be run from within Beebmon and from there DFS and other sideways ROMs can be used in total emulation mode. Beebmon can even run itself. In so doing you can nest Beebmon up to a level limited only by the memory size. Beebmon uses 256 bytes of workspace, located anywhere in memory, even on the 1MHz Bus. Beebmon effectively uses no zero page workspace, so your program (e.g. BASIC) can use any or all of the base page. How does it achieve this? By providing a 6502 interpreter all programs running under it exist in a virtual BBC, so special memory locations like the ROM latch are not actually accessed by your programs, instead they alter a location in Beebmon's workspace. Emulation also allows immediate return to Beebmon command level by ctrl-escape no matter what code is being executed at the time. All this exceptional power and flexibility is complemented by a clear and detailed manual included in a value for money price of:

£24

DISASSEMBLER ROM

Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use programmers tool.

A ROM based machine code Disassembler for the BBC micro. It enables machine code programs to be listed in BASIC/DUMP format and thus is the perfect complement to the built in assembler. It allows Sideways ROMs, files on disk or tape to be listed, and also has a comprehensive editor, allowing mnemonics to be altered directly, as well as HEX, DECIMAL ASCII and BINARY memory editing. There is also a full set of labelling facilities available (up to 3,200 labels), with the major locations and routines already labelled.

Thus DIS-ASM enables any monitor program, such as BEEBMON to be used to much greater effect as it is not necessary to disassemble memory each time the display is altered.

ONLY £18

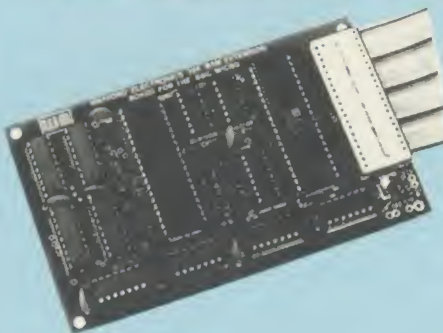
Now Available

"Acorn Speech Synthesizer"

"We can now supply the official Acorn speech chips, manual and full fitting instructions."

EXTRA SPECIAL PRICE
ONLY: £19.50

32K RAM EXPANSION BOARD



Now Watford Electronics brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. It's ribbon cable simply plugs into your micro's 6502 processor socket. This compact board which fits inside the computer doesn't just give you 16k or even 20k of extra RAM, but a massive 32K!!!

There are many more useful facilities available with this board:

- The top 20K of the expansion RAM can be used as the screen display memory, leaving all the standard BBC RAM free for programs or data storage. This allows good graphics and long programs to be combined. For instance you could have MODE 0/1/2 GRAPHICS AND 28K OF PROGRAM SPACE. The extra memory can be used by virtually any language or utility such as BASIC, VIEW, WORDWISE (1.20+), WORDWISE-PLUS, etc. and NOW COMPATIBLE with Beebug's TOOLKIT.

- The FULL 32K or the bottom 12K of the expansion RAM can be used as a PRINTER buffer for SERIAL PARALLEL printers, sound channels, RS423, keyboard or speech synthesiser. This allows very long text files to be printed while you are using 28K of program and 20K of graphics! THE BUFFER IS UNIQUE because it replaces one of the BBC Micro's buffers so all the buffer options are available on it. eg. *FX15.21, 138, 145, ADVAL(-no.) etc.

- This board is the IDEAL COMPLEMENT to any WORD PROCESSING system, disc or cassette based. There is no need to wait for slow printers as you can type in long text in 80 column display mode while printing is going on - TWO JOBS DONE SIMULTANEOUSLY!!! (an equivalent printer buffer would cost you £120 +).

- Unlike our competitors, the board is compatible with a vast range of software and hardware available for the BBC microcomputer, including our ROM expansion boards, double density DFS units, and the ATPL ROM extension board. This is because our board is connected to the computer by means of a ribbon cable without soldering. It can either be left in the micro or stuck to the lid with the 4 self adhesive feet supplied.

- The board comes with a comprehensive manual and ROM based software with a large range of commands for machine code and BASIC users, including many *HELP messages.

- Now the ROM has had a host of utilities added to the large number already provided and has been made even easier to install.

Only: £65

GRAPH PAD

With this popular British Micro's Graph-pad, you can add new dimensions to your computer enjoyment. It helps you to create your own application programs by the simple use of the Graphpad. Ideal for Educational use. Supplied complete with Cables, Manual and a two program cassette.

SPECIAL OFFER £86

BEEBFONT ROM

BEEBFONT is a remarkable and different concept in BBC software supplied on a 16K ROM. It allows you to display text on the screen in 13 different styles:

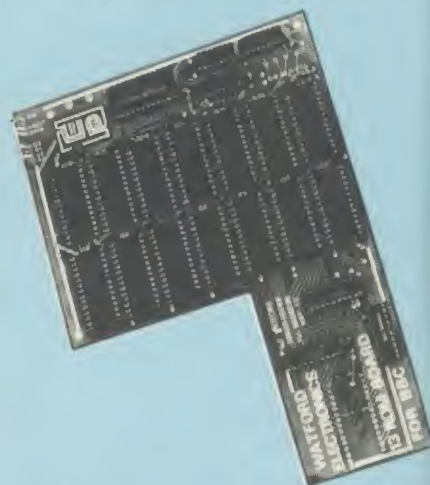
It works in modes 0, 1, 2 and 4 using the full colour capabilities of each mode. Characters are printed in the same way as normal. Selection between the various fonts is very easily achieved with Ctrl-V - press this followed by a font number and the output will continue in the new font. Beebfont ROM is particularly useful in display work with the characters produced at twice the normal size.

You can create your own character fonts with the editor supplied. You can also print-out pre-formatted text files using the special characters with Epson FX, RX and NEC printers. The full range of character styles can be used, controlled from within the text. The editor and spooler program are supplied with the package, on cassette or disc. The spooler allows word processor (Wordwise & View) output to be printed in the new characters.

A twenty page manual is supplied. Please state printer type and media for the editor & spooler when ordering (cassette, 40 or 80 track disc).

ONLY £32

Mk-2 13 ROM SOCKET EXPANSION BOARD



Now all lines fully buffered - On board battery back-up facility - will now accept EPROMS 2716, 2732, 2764 & 27128 and ROMs 6116 & 6264.

Simply plugs into one of the four ROM sockets currently available in BBC Micro. There are only 5 solder connections to be made. Full instructions are supplied. Unlike other ROM Boards, this board has been ergonomically designed to enable the user easy further expansion inside the Micro, e.g. Double Density Board, Torch Board, RAM Card, etc. without any clash. (At Watford, we think ahead). Our Mk2 13 ROM Socket Board enables the User to increase the sideways ROM capacity from the basic 4 sockets upto full 16 capable of being supported by current operating systems. In addition the board is designed with the facility to hold upto 16K RAM which when switched into operation is automatically selected by any WRITE signal to the Sideways ROM area. This gives the User the ability to write a utility or language and upon pressing break have the utility or language up and running (new ROM software can be developed and tested in situ.)

The Board gives the User plenty of freedom to explore the possibilities of the new paged ROMs due in the coming months and offers them the chance to develop their own.

All lines are fully buffered and the board meets or exceeds all timings for operation in the BBC Microcomputer.

Supplied ready-built and tested complete with fitting instructions

Only £30

PCB NI-CAD Battery for ROM Boards.

£2.75

COMPUTER CONCEPT'S ROMS

CARETAKER Basic Utility	£28
Graphics ROM	£28
Disc Doctor ROM	£28
TERMI	£27
COMMUNICATOR	£58

Wordwise

Without doubt a very sophisticated piece of software for the BBC Micro. It has all the features of a professional word processor yet is easy to use.

SPECIAL OFFER THIS MONTH: £32

WORDWISE PLUS

Now available from stock £47

SIDEWAYS ZIF SOCKET



Now Watford Electronics brings you a ROM board for small budgets or for those of you who do not wish to open up your Micro frequently. It allows you to change ROMs quickly and efficiently with the minimum of effort – no screws to loosen or keyboard to remove. The unit consists mainly of a zero insertion force (ZIF) socket on a small circuit board which is located into the position of the 'ROM Cartridge' and is connected to one of the internal ROM sockets via a ribbon cable.

• Very simple to install. NO SOLDERING REQUIRED. The ZIF eliminates the possibility of damage to your ROM pins when inserting and extracting them.

• The low profile of the socket allows unrestricted access to the keyboard, unlike other cartridge systems. In addition, there are no costly extras, such as ROM cartridges for every new ROM.

• All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

• This versatile hardware solves the problem of running out of socket space, simply unplug the ROM and plug in a different one. It is a real must for Professionals and Hobbyists alike.

ONLY £18

WORDWISE PLUS UPGRADES

Existing users of Wordwise can upgrade to WORDWISE + for £17. Please return the old WORDWISE package complete with Chip and MANUAL with your remittance and we will send you the new WORDWISE + package.

£17

BEEBUG SOFT

SLEUTH ROM	£25
TOOLKIT ROM	£23

ACORN 1.2 DNFS ROM	£15
ACORN 1.2 OS ROM	£10
ACORN BASIC 2	£20

APPROVED for use with telecommunication systems run by British Telecommunications in accordance with the conditions in the instructions for use.

MODEM 84 PRESTEL TERMINAL

For the BBC Microcomputer



The Watford Prestel package consists of the B.T. approved Watford MODEM 84 (1200/75 baud full duplex 1200 baud half duplex direct connect) and a very sophisticated Prestel Terminal ROM. Please write-in for full technical literature.

PRICES

MODEM 84 (with Lead & Manual)	£55
MODEM 84 complete with PRESTEL SOFTWARE ROM, Lead and manuals	£75
PRESTEL SOFTWARE ROM + Manual	£20
USER to USER 1200 BAUD SOFTWARE ROM	£18
(At these incredibly low prices for such a sophisticated BT Approved Prestel Terminal, Modem 84 has to be the best buy around)	
(Carriage on Modem £2)	

Nightingale Modem

Now Watford brings you PACE's NIGHTINGALE MODEM PACKAGE including the popular Commstar ROM software for the BBC Micro. Nightingale is considered to be by far the most versatile BT approved modem available at the price for the BBC Micro. It is ideal for home or business use. It offers Prestel/Viewdata baud rates (1200/75 & 75/1200) as well as 300/300 baud full duplex for communication between BBC and other computers, including bulletin boards. A bargain at our

SPECIAL INTRODUCTORY OFFER

(Price includes COMMSTAR ROM & comprehensive manuals)

£119

COMMSTAR ROM package

£29

NEW LAUNCH

16K DISC RAM

This is the RAM you've been waiting for! This battery backed up, write protectable 16K sideways RAM board allows you to run from disk every sideways ROM available. Beware of other sideways RAM boards which are not backed up as certain ROMs will not run in these boards even though the RAM can be write protected. The Battery Backup facility allows retention of DATA after power off. On switch on the Micro will think the WATFORD DISC RAM is a ROM. Features available are:

- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- All existing ROMs can be stored on disk and used in DISC RAM.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM.

Only: £39

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

Versatile BEEB SPEECH SYNTHESISER Unit



SIMPLY the best! – An unlimited speech synthesis system. Complete with easy-to-follow manual. Controlling software is in ROM so no Cassette Loading problems!

PHONEMES for word synthesis – That means unlimited vocabulary! No extra speech dictionary chips to buy!

BUILT-in Library of approximately 500 words to get you started.

ENGLISH accent – Utilises inflexion techniques to produce highly comprehensible speech.

EASY to use system – Just plug the software ROM into a socket, the Speech unit into the User Port, and away you go! No specialised 'dealer upgrade' required!

COMPACT unit – The whole system is built into a small case – easily tucked behind the computer. Auxiliary output socket provided for direct connection to an external amplifier.

HOURS of fun! – Suitable for any application – Games, Educational Programs, Specialised Packages.

We know this all seems to good to be true but DON'T BE LEFT SPEECHLESS! Order your Versatile Speech Unit now!

SPECIAL OFFER £35

Continued

BOOKS (No VAT on Books)

30 Hour BASIC (BBC Micro)	£6.95
35 Education Programs for BBC	£6.95
40 Educational Programs for BBC	£5.95
100 Programs for BBC Micro	£6.95
6502 Application Book	£11.95
6502 Assembly Language Program	£13.95
6502 Assembly Language Subroutines	£14.25
6502 Machine Code for Beginners	£5.95
6502 Machine code for Humans	£7.95
A young persons guide to BBC Basic	£4.50
Advanced Machine Code Technique for BBC	£7.95
Advanced Programming for the BBC Micro	£6.95
Advanced User Guide for BBC Micro	£11.95
Advanced Graphics with BBC	£9.95
Advanced 6502 Programming	£12.45
Assembly Language Programming on BBC Micro	£7.95
Advanced Programming Techniques for the BBC Micro	£7.95
BBC BASIC for Beginners	£7.95
BBC BASIC	£5.95
BBC DIY Robotics & Sensors	£6.95
BBC Forth	£7.50
BBC MICRO add on guide	£6.95
BBC Micro An Expert Guide	£6.95
BBC Micro Book BASIC Sound & Graphics	£7.95
BBC Micro Graphics and Sound	£6.95
BBC Micro Programs in Basic	£5.95
BBC Micro ROM PAGING System Explained	£2.00
BBC Micro Revealed	£6.95
BBC Micro Disc Companion	£7.95
BBC Micro in Education	£6.50
Basic Programming on BBC Micro	£5.95
BBC Software Projects	£5.95
Brain teasers for BBC micro	£5.95
CP/M Handbook with MPM	£11.95
CP/M The software BUS	£8.95
Creating Adventure Programs on BBC Micros	£6.95
Creative Animation & Graphics	£7.95
Creative graphics on BBC Micro	£7.50
Complete Programmer for BBC	£5.95
DISC FILING SYSTEM (DFS)	
Operating Manual for BBC	£6.95
Discover BBC Machine Code	£6.95
Discover FORTH	£13.95
DIY Robotics & Sensors with BBC	£6.95
Easy Programming for the BBC Micro	£5.95
Exploring FORTH	£6.95
Further Prog. for BBC Micro	£5.95
FORTH on the BBC Micro	£7.95
Forth Programming	£14.40
Functional Forth for the BBC Micro	£5.95
Games BBC Computer Can Play	£6.95
Getting more from your BBC & Electron	£6.95
Graphs & Charts on BBC Micro	£7.50
Graphic Art for BBC Computer	£5.95
Handbook of Procedure & Functions for the BBC Micro	£6.95
Introducing the BBC Micro	£5.95
Introducing LOGO	£5.95
Introduction to PASCAL	£14.95
Let your BBC teach u to program	£6.45
LISP	£9.25
LISP Cassette	£15.50
Logo Programming	£8.95
Mysteries of DISC DRIVES and DFS REVEALED	£5.95
Mastering CP/M	£13.65
Programming the 6502	£11.95
Programming the BBC micro	£6.95
Programming the Z80	£14.95
Programming with Graphics	£5.95
Structured Prog. with BBC BASIC	£6.50
The Complete FORTH	£6.95
The Complete Programmer	£5.95
The Epson FX/KAGA PRINTER Commands REVEALED	£5.95
Using Floppy Discs with BBC Micro	£5.95
Using BBC Basic	£6.95
Wordstar & CP/M made easy	£6.95

Watford brings you

THE AMX MOUSE

The program is simplicity itself and the user manual is virtually redundant' . . . Micro User Jan. 85.

Bring into your home or office the last word in user friendly input devices for the Beeb. The AMX MOUSE that won the hearts and the minds of thousands of visitors at the Show has arrived at Watford Electronics at a very special price!

Using simple Icons, and small movements of the mouse on a work surface, you can select any one of the functions from the pull down menus. The mouse will operate from within Wordwise, View and many other software packages. The three buttons built in to the mouse are user programmable for many extra functions.

The package consists of the mouse, the advanced controlling software in ROM and a disc containing the Icon designer and the AMS ART software.

To summarise this superb product a comment passed by a very senior authority on BBC micro at the last Micro User Show was, 'My only criticism of the product is that, IT'S TOO CHEAP!'

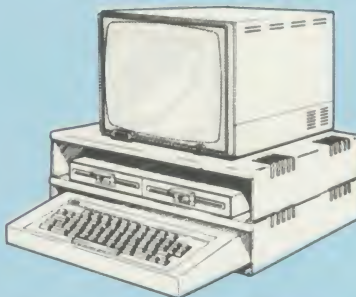


OUR SPECIAL PRICE ONLY: £68.50

AMX Art Utilities Disc £12.95

AMX Desk Disc £21.50

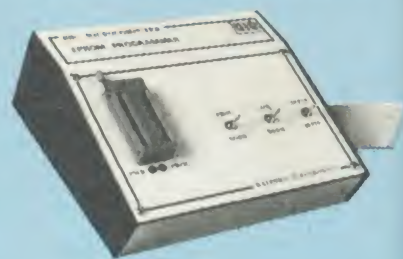
PLINTHS FOR BBC MICRO AND PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationary. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH **£11** (carr. £1.50)
DOUBLE BBC PLINTH **£20** (carr. £2.00)
PRINTER PLINTH **£10** (carr. £1.50)

EPROM PROGRAMMER



The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed - wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

SOFTWARE PACKAGE

The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette/disc loading). It is a fully purpose designed and integrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

Software facilities include:

Load File - Save File - Down Load EPROM - Program EPROM - Verify - Blank Check - Editing of memory contents prior to programming.

Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

SPECIAL OFFER £69
(£3 carr.)

LOW COST 'DIN' EPROM PROGRAMMER

A high performance, low cost, self contained 'DIN' EPROM PROGRAMMER for the BBC Micro. Plugs into the BBC Micro's user port.



The features are:

- Will program 2716, 2732, 2532, 2764 & 27128 EPROMs.
- Copy Eprom into memory and compute checksum.
- Blank check EPROM.
- Program EPROM from memory.
- Verify programmed EPROM and display checksum.
- All * commands may be used from menu mode.
- High speed programming on 2764 & 27128.
- Machine code SOFTWARE supplied in ROM.

Only: **£49.50** (carr. £2)

ANTI GLARE MONITOR SAFETY SCREEN



HEADACHES? TIRED EYES? Don't take pills - Use a Watford Electronics anti-glare filter!

● Made in Britain by a long established glass maker.

Available in 12" & 14" versions - please specify the exact monitor type when ordering

Special Price: **£16.00** (carr. £1)

SURGE PROTECTOR Plug

Fitted in place of your normal mains plug, this device protects your equipment against mains surges. Nearby lightning strikes, thermostats switching and many other sources put high voltage transient spikes on to the mains. This can lead to data corruption in memory and on disc and can result in spuriously crashing machines. Suitable for computers, Hi-Fi, Fridge Freezers etc. Max Surge current 2KAmp; max. Voltage 250. Essential for serious computer users.

Protection for only **£9.50**

FLEXIBLE KEYBOARD CONNECTOR

A 'Keyboard to Micro' replacement jumper lead.

£4.95

ATTACHE CARRYING CASE for BBC Micro

The Attache carrying case is attractively finished in mottled antique brown leatherette. The case is made of tough plywood, providing a very solid and safe way to carry your BBC micro. There is room provided to fit all the leads necessary behind the computer and manuals in the front. Locks supplied with two keys. Price **£12** (£2 carr.)

DATA RECORDER AND ACCESSORIES

Top quality slimline portable cassette recorder designed specifically for use with home computers. Mains/Battery operated with tape counter.

£20

DATA CABLE to connect recorder to BBC

£2.50

DATA CASSETTES

Top grade tested C12 Data cassettes supplied in library cases **35p** each; 10 for **£3.20**.

ASSORTED CONNECTING LEADS

(All ready made and tested)

CASSETTE LEADS 7 pin DIN Plug
to 5 pin DIN Plug + 1 Jack Plug **£2.00**
to 3 pin DIN Plug + 1 Jack Plug **£2.00**
to 7 pin DIN Plug **£2.50**
to 3 Jack Plugs **£2.00**

6 pin DIN to 6 pin DIN Plug (RGB) **£2.50**

MONITOR LEADS
KAGA/SANYO Colour Monitor Leads **£5.00**
Monochrome monitor leads BMC to Phono **£3.00**

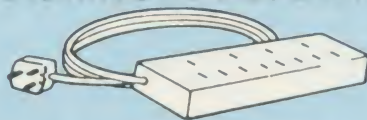
DISC DRIVE POWER LEADS
Supply from BBC power supply to standard Disc Drive connector.

Single **£3.00** Dual **£3.75**

MISCELLANEOUS CONNECTORS

	Plugs	Sockets
RGB (6 PIN DIN)	30p	45p
RS423 (5 pin Domino)	40p	50p
Cassette (7 pin DIN)	25p	65p
ECONET (5 pin DIN)	20p	30p
Paddles (15 pin 'D')	110p	215p
BBC Power Plug 6 way	80p	-
Disc Drive Plug 4 way	75p	-

4 WAY MAINS DISTRIBUTION SOCKET



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals. Allows the whole system to be switched on from one plug.

£9.99

THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSs) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Only **£20**

RESERVED

This space is reserved for
the launch of our new ROM.
See next month's advert.

ADVENTURE GAMES (level 9)

COLOSSAL ADVENTURE	£8.50
ADVENTURE QUEST	£8.50
DUNGEON ADVENTURE	£8.50
SNOWBALL ADVENTURE	£8.50
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This one will run and run

Sir, *Acorn User* ran a review of the Acorn Z80 second processor and the CP/M bundled software [June 1984]. On the strength of this article, I decided not to buy the Torch Pack and rushed out and twisted Technomatic's arm to sell me their last Z80 unit before I left to work in Iran.

As night life in Tehran is not what one would call hectic I have been systematically working through the Acorn bundled software. I have now arrived at the Mallard Professional Basic package.

Acorn supply a beautiful glossy ring-binder on the Z80 Professional Basic which lists all the Basic statements allowed – such goodies as WHILE, .WEND, etc, which leaves me drooling. But when I run the Basic CP/M disc and type in PBasic, besides the usual splurge about copyright, the screen tells me that this is a 'Run-only program'. When I try to enter my own Basic statements from the keyboard I get the genteel rebuke 'Mis-take-Direct Mode'.

The Acorn manuals are distinctly coy, simply saying 'you will be more likely to use BBCBasic to run your own programs and use PBasic to run programs written by professionals.' Your reviewer last June skipped the whole problem, simply commenting that 'Mallard is a more Microsoft-type Basic'.

Don't think I am blaming you for my problems with PBasic but please tell me is this PBasic a con? How can I join that band of 'professionals' to write programs in a 'more Microsoft Basic' for my own computer? Where can I buy programs written by these 'professionals'? Am I a victim of the CP/M virus and simply have to hit CONTROL and Q at the same time to open the magic door? What is a 'Run-only' program?

John Hunt
Tehran
Iran

Richard Boyd of Acorn replies: The first page of the Z80 Professional Basic User Guide gives the information that the system, as implemented, is 'Run only'.

Acorn decided to implement the Basic in this manner to give users the option of using

software written in this Basic, eg, *Accountant* and *Nucleus*, without the need to write their own software since they already have the use of BBC Basic to write their own programs 'interactively'.

Basic on most micros is 'interpreted' so that a user can write his program and the Basic will interpret each line as he types it in. This is totally different from most other 'high' level computer languages, eg, Cobol, Pascal or Fortran, which usually have to be written in an editor, compiled and then run.

Acorn has implemented the last two parts of this procedure ('compile' and 'run') but still allows the user to write his own program using an editor, eg, *MemoPlan*.

To write a Z80 Professional Basic program you should enter *MemoPlan*, enter 'LINE' mode (which does not insert its own carriage returns), type in the program and 'write' to disc with a '.BAS' extension to the filename.

This program can then be run by typing in PBasic filename .BAS which will run the program you have stated.

Torch mystery

solved

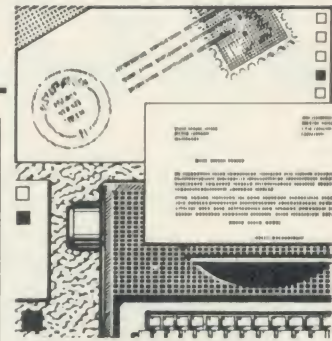
Sir, Having read Paul Beverley's article on Second Processor timings (*AU* January), and discovered that you are no further forward on the Torch 'mystery', I started my own investigations. I think I can now reveal all!

I can confirm that the effect is caused by the periodic 'polling' of the I/O processor to test whether the Escape key has been pressed. The significant factor is that, when the test is made, the I/O processor must complete any operation it is performing before returning the Escape status to the Z80. Therefore, if the Z80 chooses to test for Escape just after it has issued the DRAW command it must wait for the completion of the DRAW and therefore the parallelism is 'lost'. It happens that the Z80 does not test for Escape after every statement but only after every ten; and this lessens the slowing effect of this test! The phasing of the escape test with respect to the FOR . . . NEXT loops will therefore vary, giving rise to the odd effects discovered.

Fortunately, this effect is readily mitigated, albeit by poking into the code of Basic (ugh!). By changing the value of a byte in the Z80, we can determine how often the Escape key is tested: the appropriate byte is &3619 (version 1.92) or &37C4 (version 2.30). If this byte is set to zero, Escape will be tested only after every 256 statements. Adding the following line to the program:

```
5 ?&3619=0 : REM. for version 1.92 (&37C4 for version 2.30)
```

makes the 'parallelism' figure consistently about 85 per cent.



To restore the normal rate of testing, the contents of this byte should be returned to 10. Other values can be experimented with: a value of one results in Escape being tested after every statement and the parallelism all but vanishes!

Richard Russell
Kent

Fast error-free programming



The Addison-Wesley Bar Code Reader pack

Sir, I have recently acquired a Bar Code Reader and am very pleased with its operation. To be able to put a long program in the computer without any typing errors and in such a short space of time is a boon.

I must say, however, that I did not find it easy to start with. The speed taught by the *Scan* program was far too fast – once I slowed down my scan, the programs went in without trouble. The two essentials I found necessary to load every scan were an absolutely flat surface to read off and an even movement of the scanner. I have just entered 80 lines of bar code with only two repeat scans – something I despaired of in the first few hours of practice.

I am interested in buying an expansion board to take care of the screen memory leaving more room for the program. However, where is the software to justify this purchase? Writing long programs is not

my forte at present so there would need to be software available first. Why don't the manufacturers of these boards sponsor programs which would provide an incentive to users to purchase their products? There must be many programs written for 48k machines that could be adapted.

Allan Miles
Devon

Sir, I have been very pleased with the programs in Bar Code format that have been printed in the last few editions of *Acorn User*. Having just received my Bar Code Reader I'm keen to obtain as many listings as possible. The whole idea of Bar Codes appeals to me greatly, as little can be said for my typing.

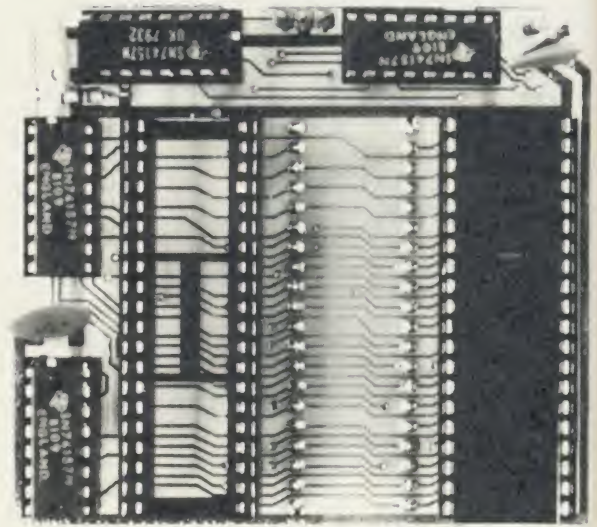
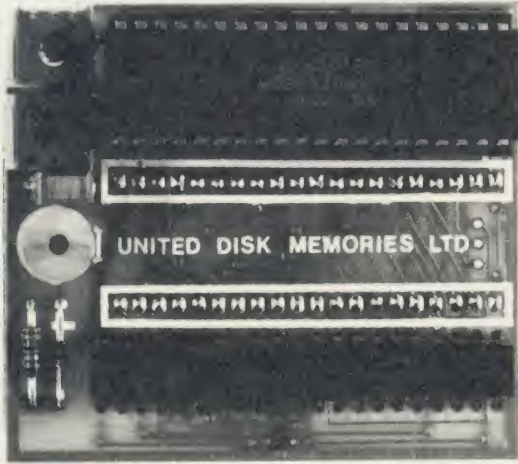
An excellent idea from a truly excellent magazine, with first class service.

Dennis Cornfield
Sunderland
page 59 ►

ASK a silly question, pass a fair comment, stage an angry protest – we don't mind what you write to us about (or about us!). Keep 'em short, keep 'em sweet, but keep 'em coming! The address is: Letters, Acorn User, Redwood Publishing, 68 Long Acre, London WC2E 9JH.

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New routines

for old printers

Sir, The program (Printer Driver for the Epson MX80) published in the March 1984 issue provides a wide range of facilities for the Mk3 version but is not directly applicable to earlier versions of this printer. Users with access to the older Mk2 printer will need to modify the routines to obtain a satisfactory printer driver and will have to ensure that the highlight codes are used correctly in the View text files.

The changes required to the program published in March are as follows:

Delete the following lines: 290, 460, 500 to 530, 590, 670 to 710, 940, 980 to 1040.

Replace lines 420, 580, 890, 920 and 950 to 1060 with the following:

```
420 .Highlight
580 LDA&32F5:BEQ DoubleWidthOff :LDA#14
:JMP Out:.DoubleWidthOff LDA#20:JMP Out
890 PRINTTAB(0,10)"Select Test (Keys B,
C, D, L or M)"
920 REPEAT K$=GET$:KZ=INSTR("BCDLMZ",K$)
:UNTIL KZ=0
950 IF KZ=1 THEN PROCemphasise:PROCPrint:
PROCemphasise
960 IF KZ=2 THEN PROCDoubleWidth:PROCPrint:
PROCDoubleWidth
970 IF KZ=3 THEN PROCCondensed:PROCPrint:
PROCCondensed
1050 IF KZ=4 THEN PROCemphasise:PROCDoubleWidth:
PROCPrint:PROCDoubleWidth:PROCemphasise
1060 IF KZ=5 THEN PROCDoubleWidth:PROCCondensed:
PROCPrint:PROCCondensed:PROCDoubleWidth
```

Finally add a new line into the Print procedure definition, as follows:

```
1055 A%=13:CALL Printer
```

When running the program the final address value printed out by line 820 will now read &32B1 (instead of &32EF) and only five test keys are supported. Having satisfactorily tested the printer driver, pressing key Z will save a file called EPSON which will be loaded by View in the normal way.

When using the Mk2 version of the MX80 it is essential that the highlight commands to switch off the condensed or emphasised modes are placed on the line following the end of the desired section. Placing these codes on the same line as the text that is intended to be condensed or emphasised will result in that text being

printed in the normal mode.

It should also be noted that the double width mode is automatically cancelled by the MX80 Mk2 when a new line command is received. This will not cause problems where the double width text is used only for single line titles, but where longer passages are required in double width the highlight codes should be used on all lines with the double width on command at the start of each line and the off command at the end of each line. Other limitations worth noting are that condensed and normal sized text may not be mixed on a single line, and that a single word or phrase in a line of text cannot be emphasised (any attempt to do this will result in either all or no text being emphasised).

Since underlining is not supported by the Mk2, some users may prefer to allocate a different function to highlight code 128 and a useful facility would

be the double width mode. To do this it is only necessary to change the CMP#130 instruction in line 440 to CMP#128 and the LDA&32F5 in line 580 to LDA&32F3.

Tony Rudkin
Herts

All the Ns are prime numbers higher than 1 (ie, 2, 3, 5 or 7):

NNN
NN*

NNNN
NNNNØ

NNNNN

What is the result of the multiplication?



Michael Furminger: new programs forecasting the weather

Satellite

software packs

Sir, In the August 1984 issue of *Acorn User*, Robin Mudge wrote about my work at Nene College on satellite reception for weather pictures.

As a result I have received many interested enquiries as to how the BBC micro can be used as a satellite decoder, and requests for information about good, cheap equipment sources, as well as helpful comments on the software.

I have produced two new software packs which cover the needs of most users. These allow both mode 1 and mode 2, distortion corrected pictures to be displayed. The special feature of Pack 1 is that no external clock is required, it uses the powerful features of the 6522 VIA to provide picture synchronisation. Pack 2 allows people who require stored reception, or users of my old hardware interface, to gain the benefits of the new software. Both packs, as well as the low-cost interface and receiver are available from Timestep Electronics of Wickhambrook, Surrey. The packs cost £9.95 (cassette) and £12.95 (disc).

Michael Furminger
Northants

Easy editing

Sir, I read with interest Jacquetta Mergary's article on *Wordwise Plus* in the February issue of *Acorn User*.

I am a user of *Wordwise Plus* and find it extremely good. It has features and qualities of word processors costing several times the price.

I must say that I found the

example *Wordwise Plus* program given in her article of absolutely supreme value. For those readers who may have missed the article, it listed a program that would delete every tenth word from the text being processed.

Now I know how journalists manage to fit their articles into the space available!

Graham Allan
Kent

Board is not

the issue

Sir, I recently bought a 6502 second processor for my BBC micro which does not work because I have an Issue 3 board. The 6502 second processor is not compatible with Beebs that have issue 3 or 4 boards.

I am waiting for my dealer to get the bits from Acorn to make the necessary modifications.

My complaint is that Acorn do not inform a purchaser that if his micro has an issue 3 board it will need modifying. A note should be included in the documentation to this effect. Since the item is sold by mail order and people insert the ROMs themselves (maybe thinking they have damaged it), this is quite important.

Peter Mott
Lancaster

Dave Bell of Acorn replies: the 6502 and Z80 second processors should work with all versions of the BBC model B PCB. If you have any specific problem with the system then consult your dealer for assistance, as in your case. For information, I use a 6502 second processor with an unmodified issue 3 BBC micro PCB.

page 61 ►

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First the

good news

Sir, After reading David C Morris's letter from Sheffield about *Elite* not working on the Micro-ware DFS, I thought I must write and tell you the good and bad news.

If your DFS is made by UDM and will not work on *Elite* (and many other programs, eg, *Mini Office*) then it is an old 1.95, 1.1 or 1.98 system. However, this can be upgraded to *Office*, *Labyrinth*, *Clare's Replica II*, etc, with no problem, but seems to take rather longer to load than the Acorn DFS.

Now the bad news. It cost me £12.50 to get the new ROM and I had to send the old one back.

The ROM in question is positioned at the right-hand side of the micro under the keyboard. It is in either IC 88 or IC 100 or somewhere near. Send this and a letter explaining the situation to United Disk Memories, Stanhope House, Fairbridge Road, London N19 3HP. Also ask for a new Disc Drive Manual as there are a few extra commands with the new ROM.

I hope this will help Mr Morris and other readers to get the most out of their DDFSs.

J N Willmott
N Humberside

How big are

turtle steps?

Sir, I was amazed by M P Doyle's letter in the February *Acorn User* which complained about the 'arbitrary units' used by the Jessop and Valiant turtles.

What is sacred about 'conventional units'? (They were, of course, arbitrary before they became widely accepted.) Which conventional units would Mr Doyle wish to use? Inches, centimetres, picoparsecs? What is this 'reality' of which Mr Doyle speaks - there is no special

reality in units of conventional measurement, and nothing that a child cannot learn about geometry using non-conventional measurement systems.

Any line can be measured with a ruler. Let the child discover the relationship between inches and turtle

JESSOP TURTLE



VALIANT TURTLE



The Valiant Turtle takes larger steps than the Jessop Turtle - but neither uses conventional units of measurement

Records bonus in database change

Sir, As a Beeb owner I was very pleased to find Mike Fryer's database program listing in the December issue of your magazine.

However, when typing in and taking a close look at the program I discovered some interesting changes could be applied. After a couple of hours' work my version appears to save quite a large amount of memory space.

I'll explain the changes I've made in my listing:

I thought it would be faster and simpler to check if there is a keyword in a record during

the deletion process, instead of checking it in advance. The secret of my solution lies in the positive and negative values of $m\%$ and of the $INSTR()$ - 0.5 statement. The addition of commas to $k\%$ and $q\$(1,f\%+1)$ is necessary to prevent deleting or including records containing a keyword which is longer than $k\%$.

As you can see, I split each record in two, and exchanged both parts, instead of putting the field on which the records have to be sorted in another array. For example, when sorting on the third field, $d\$(g\%)$

(which was: $aa\#bb\#cc\#d\#ee\#$) will be: $cc\#d\#ee\#aa\#bb\#$ during sorting. This method works faster than the one in your listing.

A B van der Bom
The Netherlands

Mike Fryer replies: These ideas seem very sound and interesting. They should certainly substantially increase the number of records that can be handled.

However lines 2070, 2090 and 2100 should also be deleted, and the additional lines 3420 to 3510 should be renumbered 2181, 2182, to 2190 so that they form part of DBASE5 (so that the disc based system will still function properly). The approximate number of records ($mr\%$) calculated in lines 740 and 1020 is now too low, and in both cases the formula should be replaced by:

$mr\% = (HIMEM - TOP - 1800) / (0.3 * nc\%)$: IF $mr\% > 200$ THEN $mr\% = 200$

Some readers have had problems with the Database program. It looks as if line 555 is mainly to blame. It's not obvious from the article that there is a space between the quotes at the end of the printed line and the beginning of the next. It should read:

555 $\$ \&C00 = "LOAD DBASE" + n\$ + " " + STR\$ (t\%)$

Other points to note are that in lines 510, 1200, 1240, 2370 the " " is produced by the SHIFT key. May I also suggest you replace the f in line 130 by a 0 (zero) and the P%(f%+1) in line 1220 by p%(f%+1).

```
1625 IF c$="D" THEN m%=-1 ELSE m%=1
1630 j%=0
1635 k$=" "+k$+" ",
1640 FOR g%=1 TO e%
1650 PROCunpak(1,g%)
1655 IF m%*(INSTR(" "+q$(1,f%+1)+" ",k$)-0.5) > 0 THEN j%=j%+1:d$(j%)=d$(g%)
1660 NEXT
1665 e%=j%
```

Delete: PROComit, PROCsplit, in% (record%)

```
2080 IF ans%>1 THEN PROCrepak
2110 REPEAT
2120 flq%=0
2130 FOR g%=1 TO e%-1
2140 IF d$(g%)>d$(g%+1) THEN dum$=d$(g%+1):d$(g%+1)=d$(g%):d$(g%)=dum$:flq%=1
2150 NEXT
2160 UNTIL flq%=0
2165 IF ans%>1 THEN ans%=f%+3-ans%:PROCrepak
```

```
3000 :
3420 DEFPROCrepak
3430 LOCAL k%,j%
3440 FOR g%=1 TO e%
3450 k%=0
3460 FOR j%=1 TO ans%-1
3470 k%=INSTR(d$(g%),"!",k%+1)
3480 NEXT
3490 d$(g%)=RIGHT$(d$(g%),LEN(d$(g%))-k%)+LEFT$(d$(g%),k%)
3500 NEXT
3510 ENDPROC
```

Delete: d1\$(record%)

The art of

printing £s

Sir, In the Letters column of your February issue, Mr Abel of Dunbartonshire wrote of his difficulties in getting a £ sign to print on his Shinwa CP80 printer.

The £ sign, several accent marks and other characters as well as a backspace character, will print on the Shinwa if a combination of Shift and the function keys is used.

If used in mode 7, this combination produces coloured text on the screen, but the embedded codes will produce these characters on the printer. The Shinwa manual makes no mention of them. Shift/f1 produces the £ sign.

D A Deaver
Saudi Arabia

FADE + DEAF + BEAD = ?

page 63 ►

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CENTRAL PROCESSING... CENTRAL PROCESSING...

I Montgomery, Cleadon

Occasionally pound signs (£) have crept into listings – though we hope that they will not do so in future. But yes, when they have done they normally refer to the hash character (#).

For a comprehensive list of Epson control codes I suggest you purchase the February *Acorn User* listings cassette, where they are contained in a *Wordwise* format.

George Scerri, Malta

To my knowledge there are no books containing detailed descriptions of the OSWORD calls &7A to &7E. These calls are mainly concerned with writing to and from the disc controller chip itself and as such are used by many software houses to implement their protection. The October 1984 issue of

tainly due to some form of 'ROM protection' that prevents it being used in sideways RAM. Obviously I am not at liberty to disclose how you might be able to circumvent this.

T. G. Ward, Bideford

The program time specified for a 2764 EPROM is 50ms ± 5ms per byte. However you can normally get away with a very much shorter time period, and the writers of programming software tend to take advantage of this fact.

I would suggest that your problem may have its roots in the software provided with your EPROM programmer, which is being just a bit too skimpy with its programming time.

Patrick Smith, North Shields

A good selection of Electron

Because of the large amount of technical enquiries we receive in the *Acorn User* office we are now unable to reply to individual letters. However, this new feature is intended to answer as many of your queries as possible, and should provide a useful information spot. Please keep your letters short and to the point.

Acorn User gives some insight into these calls however.

Christopher Morris, Louth

You will need an RS423 interface for your Electron to be able to use a modem. Acorn will be producing one that will plug into one of the two cartridge sockets in the Plus-1, but I am unable to give a date for its launch.

Sgt Boyd BFPO 45

A checksum program for use in entering Basic programs is well under way – we hope to present it in the near future.

Francis Aries, Herts

Your problem is almost cer-

XX
XX*

XXX
XXX

XXXX
+ 1XX

XXXXX

This is an ordinary multiplication and addition sum. The Xs represent any digit. What's the result?

software can normally be found in larger branches of WH Smith. If you do have problems try writing to Acornsoft for their software catalogue.

B S Greenes, Gateshead

Yes it is possible to use the BBC micro to control a synthesiser in the manner you suggest, but you would need to use a good amplifier. A typical example of this type of application is the Music 500 package. I do not know of any books giving details of how to build this type of hardware.

Kevin Bowen, Cardiff

All the details of the activity board were published in the August 1984 issue of *Acorn User*.

R P Dennis, Mansfield

The fact that the same error keeps occurring tends to suggest that the problem is in the disc itself. No amount of sector re-editing will resolve this, so I would suggest you transfer the contents of the disc to a new one and discard the faulty disc.

T A Manning, Wirral

There is certainly enough memory for *Quadline* (January 1985) to run on the Electron. I suggest that you re-read the notes on how to enter the program.

Kitty advises on communications – the equipment and terms used



Q I would like to use my BBC micro to gain access to one of the many bulletin boards that are now available. I am unsure exactly what a lot of the terms involved mean, so a gentle introduction would be most appreciated! Could you give me some advice as to exactly what equipment I am likely to need please, and what it will cost?

Linda Dhondy
Isle of Lewis

A First, you will need to purchase a modem. This is the box of tricks that connects your micro to the telephone, converting the signals that both require into a suitable format.

There are many different types of modem available, and at varying costs. One thing you must ensure is that the modem is BABT approved. This means that British Telecom have seen and approved the system for use with the national telephone network system. Using a non-approved system can be dangerous to both you and other users and you can be fined if you are caught at it.

Before deciding on your modem, evaluate what you will require from it. For example, if you are only interested in using Prestel with Micronet 800 and Viewfax, then a modem which could also use other boards might be an extravagant extra. In this case, a modem such as the Acorn Prestel Adapter would be more suitable.

Another term you will need to understand is baud. This simply refers to the speed at which data is transmitted and received by the BBC micro. Various combinations are used such as 300/300 (transmit and receive at 300 baud) for BT Gold, 1200/75 for Prestel, and so on. Many modems will cater for all: for example, the Minor Miracles WS2000 or the Nightingale by Pace.

The final term you should be familiar with is duplex;

modems may be either full or half duplex. The former means that data may be transmitted in both directions at once; the latter is only capable of transmitting or receiving but not both together. Again most modems will cater for both.

Many also offer auto dial and answer options. The auto dial facility allows the modem to dial the number for you, and in many instances sign on to the board you are dialling. Auto answer allows you to set up your own bulletin board so that people may call you and leave their messages. You will need to dedicate your micro for this, however. Again, it's a matter of whether these are cost effective or not.

One final point on the subject of modems is to remember that you will need one of the new plug-in type phone wall connections to allow your modem to be connected. Most new phone installations will use these plug-in systems; older versions can be changed by BT for a small charge.


Obviously you will need some software to drive your modem, and it's best to have this in ROM. There are many packages around such as *Termi* and *Communicator* from Computer Concepts, *Comstar* from Pace and more recently the *Demon Zromm* from Rushworth Dales, which is very flexible. Some modems such as the Prestel Adapter come with software already included. Beware, though, if you buy an auto dial or answer modem that the software you select also has that capability. A dealer can advise you.


As to the cost, it varies enormously. You can spend between £60 and £200 on a modem, with software ranging widely in price (ROMs being more expensive). Have a look at the comparative reviews on modems and software in the February and April 1985 issues of *Acorn User*, and scour the advertisements.


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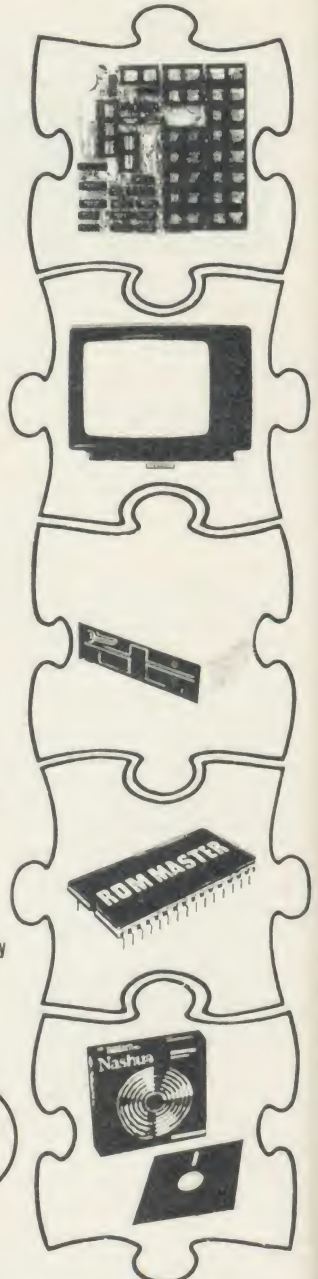
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LOGO: THE BIG FOUR

Joe Telford compares the major implementations of the language



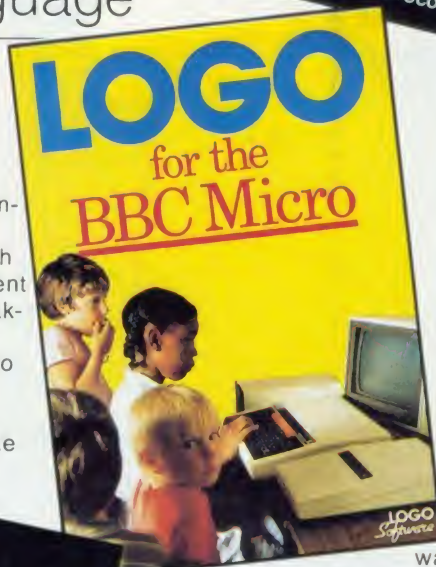
65

Having introduced Logo to the uninitiated (April issue), and pointed out some of its strong points and failings, I'll now consider the implementations of Logo on the BBC micro. There are four major versions of the language currently available, from Acornsoft, Logotron and LSL, and Open Logo, developed by the Open University and produced by BBC Publications.

Introduction

The first thing to mention is that as we were hearing about Logo for the BBC micro two years ago, we might be forgiven for expecting that the final packages would be of a uniformly high standard. My impressions of all the Logos were somewhat reduced when I discovered that each had its own standard. This is fine, once you've learned it, but it requires a cross translator to transfer routines between dialects. This is a very sad state of affairs. Whatever the end product, we should be moving towards standardisation of Logo, with perhaps varying extensions.

I suspect a major reason for my annoyance at the differences in the languages is that it makes a comparative review more difficult. Each version has different strengths and weaknesses, and it becomes difficult to decide on an overall 'winner'. The approach I take



Acornsoft: wealth of commands

Chris Jobson and John Richards and seems quite close to the Apple Logo currently available.

The Logotron version came in its finished packaging and consisted of a manual in a ring binder plus a single 16k chip, written in machine code. This version

was written by ACT/SOLI

to the LCS1 standard and as such should be completely compatible with other Logos written to that standard, for example, the Sinclair Spectrum and Atari 800XL. In fact this is only partly true. Page 163 of the Logotron manual says that they have removed POTS, POPS and PONS, which respectively print out titles, procedures and names, because they were confusing. Page 77 of the Sinclair Logo manual regards these words as part of the LCS1 standard. Because the Sinclair version was also written by SOLI, I can only assume that the LCS1 standard is variable — which reduces the effectiveness of having a standard at all.

The LSL implementation also arrived in its finished packaging, with a single 16k machine code chip and one manual. This version, which seems to have been some time in preparation, was written by Paul and Kay Crowe of Catsoft.

Open Logo came as two 16k chips (one being the language, the other including maths extensions), a tutorial manual and a reference manual. Also included was a disc of example programs and a second processor copy of Open Logo.

page 67 ►



Above.
LSL
Logo:
speedy

Left.
Open
Logo:
good for
older
users

Bottom.
Logotron:
compatible
with other
Logos

in this review is to examine the four Logos in parallel and by sections.

Overview of each system

Two of the four Logos (Acornsoft and Open Logo) were supplied with pre-production manuals. The Acornsoft implementation comprised two 16k chips, a tutorial manual and a reference manual. Also in the pack was a disc of extensions and demonstrations. Acornsoft Logo was written in BCPL by



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All the versions ran on the second processor although, because of its structure, Open Logo had to be loaded from disc (not necessarily a bad thing!).

The manuals

Both Open Logo and Acornsoft Logo had dot-matrix printed manuals, because they were pre-production copies. There were a number of typographical errors and diagrams were not included, but this should be corrected in publishing. Open Logo's tutorial manual uses an interesting style of writing which includes 'I did...' It always makes for good reading in narrative form, and is not unpleasant. Perhaps it emphasises the adventurous nature of Logo.

LSL have produced a spiral-bound manual with colour-coded sections, and one of the most interesting acknowledgements I've ever read twice. The sections include a children's tutorial, teacher's notes and a reference section. There are a number of typographical errors, but an enclosed sheet corrects them. Issue two of the manual was due to go to press and this would correct the copy to date.

Logotron's manual has been designed for expansion. In a glossy ring binder, the loose-leaf pages can be updated as new extensions appear. Several times the index informed me that a word was on page n, while it was actually a page or two earlier or later.

In both the Acornsoft and Open Logo manuals, items are very well explained, with the Open Logo manual being best in terms of information about the language syntax and extension to machine code. In my opinion, the Logotron manual is best at explaining Logo programming for the interested teacher or adult, while LSL's manual with its simple layout is easiest to use. Its 'Young person's guide to Logo' is also more appropriate for children than the other tutorials. The last page of the LSL manual has a set of

perforated function key overlays, which can be fitted to the BBC micro to help with handling the editor.

Benchtesting

Table 1 demonstrates the speeds of the different Logos. Figure 1 contains the listings used. Both LSL and Logotron Logo perform well, with Logotron taking the edge. Acornsoft's *bête noire* seems to be list processing, while Open Logo seems to balk at graphics.

The odd result for LSL in benchtest 6 reflects the lack of a machine code ATN function. This seems trivial, but without it conversion back to degrees cannot be performed.

Even the fastest Logo performs more slowly than Basic, but we should remember that in many educational situations all the Logos will perform fast enough for children. It is mainly in limiting situations where the speed will be critical, eg, in music, information handling, control and some language processing.

Graphic primitives

The widest range of primitives here come from Acornsoft Logo. The special functions of this version include returning the distance of a turtle from any point on the screen, as well as the direction of travel needed to reach that point. In Acornsoft Logo and Logotron Logo the general approach to finding an equivalent of PLOT is to provide a SETNIB command which duplicates the facility. LSL Logo uses the subset FILL/NOFILL, and Open Logo uses PAINT. This is the only version that will fill a predrawn shape.

In all versions, drawing with the turtle showing is much slower than drawing with the turtle hidden. For some reason, Open Logo is particularly slow here.

Only the Open and Acornsoft versions have multiple turtles already available. Open Logo has four, while Acornsoft has up to 32, although this

requires loading an extension from disc. Open Logo allows the user to keep track of each turtle in relation to the others. However, multiple turtles run slower than single turtles, and it should be possible to run a turtle in LSL or Logotron Logos to give the appearance of two or three separate turtles. This will require some programming expertise on the part of the user, or waiting until the sprite boards for these two Logos become available.

All the turtle 'fields' are roughly rectangular except for LSL Logo, which uses a square field and a larger turtle step (eg, FORWARD 50 in LSL Logo is equivalent to FORWARD 200 in the others).

Numeric primitives

Again a wide range from Acornsoft, some of which must be loaded from an extension. The OU version also has a wide range, but these are built in. Logotron, Acornsoft and the OU versions use infix notation as well as prefix notation. This means that

PR 23 + 54

will work as well as

PR SUM 23 54

LSL goes for the more traditional prefix notation, with the result that its arithmetic routines are very swift indeed. It is worth noting that Open Logo has some of its keywords rearranged so that, for example, PICK in Open Logo is a variation of RANDOM on the others. Not good for converting between Logos, but remember my comments about standardisation.

Control flow and conditional primitives

Again Acornsoft has the widest range, if not the best implementation. Following the Apple format, it uses THROW and CATCH to switch control during execution. It also includes a DOFOREVER loop. Although all the Logos in-

Bench Test No	Test tasks	Acornsoft	Logotron	LSL	Open
1	100 empty repeat loops	0.14	0.22	0.99	0.45
2	100 procedure calls	0.67	0.63	2.10	0.85
3	100 assignments of a 10-element list	3.10	0.84	2.20	2.52
4	100 assignments & 2 way parameter passing	4.20	1.60	2.80	3.49
5	100 sets of arithmetic	16.00	7.20	4.20	7.40
6	100 sets of trig	21.00	13.00	76.00*	9.90
7 Turtle shown	100 x 2 sets of forward backward	31.00	16.00	40.00	54.00
7 Turtle hidden	100 x 2 sets of forward backward	19.00	5.00	11.00	31.00
8 Turtle shown	100 x 4 sets of 90 deg left turns	33.00	26.00	40.00	45.00
8 Turtle hidden	100 x 4 sets of 90 deg left turns	22.00	13.00	11.00	7.50
9	100 printings of a 10-element list	15.40	4.40	6.00	5.60
10	100 reversals of a 10-element list	126.00	21.00	54.00	68.00

* ATN function not available - replaced by Logo procedures from LSL manual

Times in seconds

Table 1. Ten benchtests demonstrate the performing speeds of the four Logos. Logotron averages out fastest

clude an IF... construction, LSL does not include infix notation here, so that for example:

```
PR :cat = []
```

must be translated to

```
PR EMPTY :cat
```

This again gives an increase in speed, but is not so flexible. Only Open Logo allows consideration of the \geq or \leq operation without resorting to AND or OR, and this is done with the new commands GEQ and LEQ, ie:

```
IF GEQ 7 3 [PRINT 7] [PRINT 3]
```

should print 7.

No outright winner or loser in this section.

Data and list processing primitives

As we have come to expect, Acornsoft has the lead here, too, with the largest available selection of commands and operations. Unfortunately it is in this area where its timings are worst. Before assessing whether there is a winner in this category, we need to consider some of the problems associated with the four Logos.

Open Logo and LSL Logo both use the JOIN operation to combine lists or words. This in itself is reasonable, and compares with the use of SENTENCE by the other two Logos. Unfortunately it is not possible to join a WORD to a LIST in LSL Logo or Open Logo, so that

```
PRINT JOIN [WE LUV] "KITTY
```

produces an error message which confirms this. Obviously, spokesmen for the various products will differ over which is the better approach, though I feel that the general solution is often the best. In talking about non standardisation, users should consider the Open Logo approach to naming things. Although

```
MAKE "Cleveland [Teaseside  
Heartlepool etc]
```

is acceptable,

```
PRINT :Cleveland
```

issues the error message

```
:Cleveland has no meaning
```

To print correctly we should use

```
PRINT Cleveland
```

You might think that this would cause confusion between procedures and named variables. The first time I defined "Cleveland as a variable, I tried to use it as a procedure by typing just

```
Cleveland
```

and was foiled by the message

Don't know what to do with system error 3. Press Break.

Feeling that this was so far from Logo philosophy, I intuitively extracted and refitted the Open Logo chips and tried again. This time I was rewarded with

Cleveland has no meaning

```
benchmark 1:
PRINT "S REPEAT 100 [] PRINT "E

benchmark 2:
TO BLOCK
MAKE "LIST [A B C D E F G H I J]
END
PRINT "S REPEAT 100 [BLOCK] PRINT
"E

benchmark 3:
TO BLOCK
MAKE "LIST [A B C D E F G H I J]
END
PRINT "S REPEAT 100 [BLOCK] PRINT
"E

benchmark 4:
TO ENLIST :list
MAKE "newlist RELIST :list
END
TO RELIST :list
OUTPUT :LIST
END
PRINT "S REPEAT 100 [ENLIST [a b
c d e f g h i j]] PRINT "E

benchmark 5:
TO BLOCK :size :inc
MAKE "size :size + :inc
MAKE "size :size - :inc
MAKE "size :size / 2
MAKE "size :size * 2
END
PRINT "S REPEAT 100 [BLOCK 50 10]
PRINT "E

benchmark 6:
TO BLOCK :size
MAKE "trig (ATN ((SIN :size) /
(COS :size)))
END
PRINT "S REPEAT 100 [BLOCK 50]
PRINT "E

benchmark 7:
TO BLOCK :size
REPEAT 2 [FORWARD :size BACK :size]
END
PRINT "S REPEAT 100 [BLOCK 50]
PRINT "E

benchmark 8:
TO BLOCK :size
REPEAT 4 [LEFT :size]
END
PRINT "S REPEAT 100 [SQUARE 90]
PRINT "E

benchmark 9:
SETMODE 7
TO PRINTER :text :times
MAKE "c 0
REPEAT :times [MAKE "c :c + 1 PRINT
(FPUT :c :text)]
END
PRINT "S PRINTER [a b c d e f g h
i j] 100 PRINT "E

benchmark 10:
TO BLOCK
MAKE "newlist REVERSE [[A] [B] [C]
[D] [E] [F] [G] [H] [I] [J]]
END
TO REVERSE :list
IF :list = [] [OUTPUT []]
OUTPUT SENTENCE REVERSE BF :list
FIRST :list
END
PRINT "S REPEAT 100 [BLOCK] PRINT
"E
```

Figure 1. The listing used to perform the 10 Logo benchtests

Apparently a subset of Open Logo must work with only one chip. Even so, this new approach to naming variables is a move away from whatever standard seemed to exist.

Talking in terms of non standard languages, LSL has its own problems because it uses commas to separate commands. I assume this is done for speed and ease of decoding. It seems strange to start with, but I expect it can be lived with.

Back to Acornsoft Logo, which contains such a wealth of extra list processing commands like ADDITEM, ERITEM and SETITEM that if it wasn't for its slowness of operation I'd be more than impressed. Logotron Logo and Acornsoft Logo come out joint top here.

Debugging primitives

As usual, Acornsoft is the most complete, using a particularly useful powerful tracing command. However, complete here does not mean best. The honours here go to LSL Logo with its easy to use debugging commands: SPY, TRACEP, TRACEV, REPORT and WALK.

Logotron has the smallest set of debugging procedures.

Procedures

Acornsoft and Logotron have the largest range of procedural primitives, followed by Open Logo and then LSL. Particularly amusing are the non-standard commands for reclaiming workspace: TIDY (Acornsoft), RECYCLE (Logotron) and GCOLL (Open Logo).

File handling primitives

There are two types of file handling primitives to consider. The first is the facility to save procedures to a filing system, the other is to save datafiles. All the versions can SAVE and LOAD single procedures, although Open Logo and Acornsoft Logo have commands to load and save screens currently available as primitives. All except LSL have some means of packaging the procedures so that the whole workspace can be saved as one filename. All versions appear to work with Econet, although Logotron recommends a modification to its SAVE primitive if an Econet is in use.

I personally prefer to *SPOOL text to the filing system, as this gives me maximum flexibility and also allows me to use either *Wordwise Plus* or the Acorn wordprocessor as a very powerful editor.

When it comes to data filing, the story is much reversed. The first prize for data handling must go to LSL, with a wide range of filing commands. Logotron is also in the running, but alas,

having used the wonderful data handling commands of Acornsoft Logo, we are unable to file any database made with them. This omission must be regarded as serious by teachers of IT and awareness courses. I wonder if Acornsoft consulted its CES team on this matter? After all, this is highly thought of by teachers of computing and advisers across the country.

Machine specific commands

However machine specific commands are presented, it is inevitable that they will try to mimic the Basic equivalents, down to the name if possible. Thus we lose the lovely ? operator for the dubious DEPOSIT or POKE and EXAMINE or PEEK. These commands are lacking on LSL's version, and despite my condemning them, it does seem a good idea to have some way of getting to terms with monitoring and controlling the environment. Logotron also lacks an ADVAL command (surely an important facility) and the real time clock of the other versions. This is sad because timing and handling time is very valuable to young children. Only Open Logo supports OSWORD calls, but this seems in keeping with its apparently academic aims. Acornsoft Logo wins this round, with Open Logo second.

Memory

All these versions of Logo make demands on memory, and all except LSL perform garbage collection on demand. Memory is generally measured in nodes, the number of which vary depending on the screen mode in use. One way of measuring memory usage is to use a standard (ha!) program which eats up memory, and to see how many times it will recur before running out of room.

A typical program might be:

```
TO SPACE :no
PRINT :no
SPACE :no + 1 (or SPACE ADD :no 1)
PRINT :no
END
```

which gives the results shown in table 2 when called in mode 7 with the command SPACE 0.

Added to which, a Fibonacci sequence test by recursion failed at similarly low numbers on Acornsoft Logo. Open Logo wins here, and Logo-

SUPPLIERS AND PRICES

Acornsoft Logo

Available from Vector Marketing at £59.95.

Education class sets of 10 at £300. Information from Bob Coates (Senior Education Advisor), Acorn Computers, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN

Logotron Logo

Available from Logotronics at £59.95.

Education class sets of 10 at £300. Information from Chris Roper, Logotronics, 5 Granby Street, Loughborough, Leics.

LSL Logo

Available to home users from LSL at £59.95.

(Education prices and delivery from Edward Arnold, 41 Bedford Square, London WC1B 3DQ.)

Information from Chris Squire, LSL, 316a Richmond Road, Twickenham, Middlesex.

Open Logo

Available from BBC Publications at £69.95.

Information from Software Editor, Software Department, BBC Publications, 35 Marylebone High Street, London W1M 4AA.

tron just beats LSL into second place because of the fatal out of space error in LSL.

The editor

Each version has an editor, in effect an input buffer for entering and editing procedures. It takes the form of a blank text screen and behaves like a simple wordprocessor. However, all the Logos except LSL can create procedures outside their editors, using commands like TO or DEFINE.

Within the editors, each has its peculiarities. Acornsoft's seems to take up a large amount of memory permanently. Logotron's alters to fit the current mode. Open Logo's is prettiest, in a multicoloured mode 7 display. It also contains the most information in switchable HELP menus. LSL's, although having only very basic text editing commands, follows the format

of editing in BBC Basic. The others are 'on screen editors', where all changes are implemented when the editor is left, although the screen alters as the editing is done.

Error messages

All the Logos support a set of error messages. Generally these are all very informative. I particularly liked Acornsoft's easily understandable messages, although Open Logo is impressive too.

I was sad to see that some of Logotron's messages had to be decoded: for example, with a fence in place Acornsoft Logo gave the message 'Turtle hit fence', LSL Logo said 'Can't FORWARD 500 Out of bounds', but Logotron said 'I don't like 500 as input'.

Extensions

All the four firms have planned or are currently offering extensions. Acornsoft's are already available on disc and included in the package. Utilities for screen dumping, multiple turtles, maths routines, and floor turtles are among the offerings here.

At the time of writing, Logotron is planning a sprite extension board at around £160 as well as other extensions on disc, which are expected to be as cheap as possible. This would certainly be welcome.

LSL has its own sprite board in the pipeline, and is taking feedback from users as to what extensions it should add, although procedure packaging is definitely on the cards. Hopefully it will not be long before these arrive.

Open Logo comes with a disc of utilities, which are very interesting to run. Also expected are distance learning material from the OU based on their Logo, and this in terms of adult education may prove a deciding factor in the battle of the Logo chips.

All versions have or expect to have, (or believe other companies will provide) extensions for the two common turtles:

1. The Jessop Turtles (All species)
2. The Valiant Turtle (Acornsoft Logo will drive four at once!)

and for their close relatives:

3. The Penman Plotter
4. The BBC buggy

Conclusions

As you can see, there is no outright overall winner in the battle of the turtles. It depends on your own interests and on which facilities you need. Let's consider my likes and dislikes across the group.

Open Logo

I liked its maths routines, its editor, its

Logo	Recurrences	Comments
LSL	644	Out of room is a fatal error
Open Logo	409	Recoverable
Logotron	324	Recoverable
Acornsoft	80	Editor uses large part of workspace

Table 2. Results of running a recursive memory-test program

documentation, its extension disc and the disc copy for second processor use. I disliked its speed for list processing and graphics, the twin chip system, its way of naming variables (this is personal preference) and its lack of data-file handling.

Conclusion: probably most useful for older users, but I look forward to probable OU teaching materials.

LSL Logo

I liked its speed, its debugging primitives, the datafile handling, the single chip system and the manual. I disliked the lack of infix notation, the lack of ATN function, commands separated by commas (again personal preference), the editor and the fatal 'out of room' problem.

Conclusion: I became more impressed with this version as I used it. Most likely to have success with children in the middle school range.

Logotron Logo

I liked its overall speed, the editor, its list processing, the single chip system, its filing and the manual. I disliked its method of changing modes, the system

crashing on using *COMPACT, *COPY or *FORMAT, the lack of ADVAL command, debugging commands and time clock.

Conclusion: for general use, this Logo covers a wide range. It is generally compatible with Spectrum, Atari and Apple Logos and hence should appeal to many users. However, I would like to see an extension disc curing some of the problems. The sprite board should also prove interesting.

Acornsoft Logo

I liked the wealth of commands, the extension disc, its documentation, the graphics generally and particularly the multiple turtles (which can change shape). I disliked its slowness, its twin chips, the space used by the editor, and the lack of datafiling commands.

Conclusion: despite its slowness, this version has much to offer, particularly in the area of cheap graphics, eg,

See page 79 for
Acorn User's special
offer on the Valiant Turtle

the multiple turtles, etc. Users need to beware of its problems with recursion, which are partly caused by the space used by the editor. Acorn is making the language available for the Electron, and users needing compatibility should think about this version. I would probably place this with younger users, and include a floor turtle in the package.

Final considerations

In many ways one version of Logo would have forced the issue of which one to buy. Certainly Acornsoft's is not up to the standard of BBC Basic, but then nor are any of the others. If you want to buy a Logo system, you need also to think in terms of the end cost. An expansion ROM board may be needed for the two-chip systems, while the single chip versions may need expensive sprite boards to give multiple turtles.

Schools wishing to enter the realm of Logo should almost certainly buy either Acornsoft or Logotron versions because of the low prices currently available. It might be wisest for home users to check with their children's schools before buying their own copy.

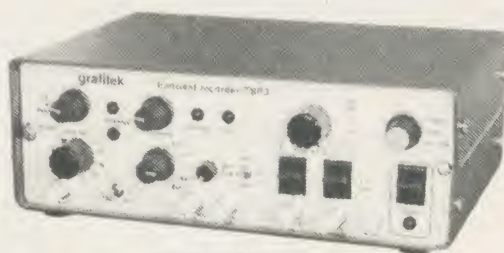
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

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THIS program allows you to generate film sequences of a human figure. It is based on a frame system: 650 frames can be held in memory and replayed at speeds up to 10 frames a second.

On running the program you are prompted to input the screen mode you want to run it in. Select either mode 1 (for around 250 frames) or mode 5 (for around 650 frames of a lower resolution).

You are then presented with a menu. Press Escape at any time to return to this menu (pressing Escape at the menu exits the program).

Menu options

1 Show film This prompts for a delay between the frames, in centiseconds. (The computer takes 10cs to simply display every frame, so take this into

account.) Then you are asked whether you want to show the film in single steps, ie, waiting for you to press a key between each frame. After that it asks if you want to see the entire film: entering 'N' will allow you to enter the first and last frames to be seen. Pressing Return on its own in answer to the delay prompt will show the entire film at the fastest possible speed, with no need to enter the other parameters.

2 Edit film This prompts for the frame you want to edit, and displays the number of frames currently in memory. If you choose a frame number higher than the present top, all the frames between the old top and your choice will be made equal to the present top, ie, if there are 90 frames in memory and you choose frame 104 then 91,92,93 and 94 will be made equal to 90. A frame is edited by manipulating one of the

limbs. Press 'L' and then the number corresponding to the part of the body in figure 1. Move the point with the cursor keys, using Shift to accelerate the movement.

From edit mode a number of other features can be selected by pressing the following keys:

I: 'Inbetweening'. This powerful command takes the hassle out of creating smooth sequences. For instance, to create a sequence where the figure goes from having outstretched hands in frame 10 to hands akimbo at 20, set 10 and 20 how you want them; press 'I'; enter 11 for the first frame (since it is the first you want changed) and 20 for the last.

C: Copying. Pressing 'C' allows you to copy a sequence from one set of frames (the source frames) to another (the object frames). Answering 'Y' to the

This demonstration sequence by Joe Faith is one of two included on our monthly listing cassette

question 'Reverse?' will reverse the order of the object frames – useful for making the figure repeat a sequence backwards.

S: 'Saming'. This command simply prompts for a frame number to make the present frame equal to.

3 Load new film Self-explanatory.

4 Save present film Self-explanatory.

The display order table

The 24 bytes making up any frame are stored in memory in a certain order. They are also a quarter of the actual screen co-ordinates to be plotted, to allow for one byte per co-ordinate.

The display order table shows in which order the 12 x,y pairs should be plotted: if 100 precedes any pair, it indicates the cursor should be moved, not drawn, to that co-ordinate. The values are offsets from the first byte, so to draw a man:

1. The address of the first byte is found.
2. The first value from the display order is read.
3. If it is 100 move the cursor and get the next value.
4. Use this as an offset to read the next X co-ordinate and times it by four.
5. Repeat with the Y co-ordinate.
6. If all the points have been plotted/drawn END, otherwise go back to 2.

330-380: increments loop counter and performs OSWRCH 25 (plot).

390-510: if next number in display order table is 100 send a 4 (move) instead of 5 (draw) to OSWRCH.

510-530: get offset from display order table into Y and use it to load A with the next x co-ordinate to be sent.

540-660: multiplies it by four to get the real value and stores it in &8E (high) and &8D (low).

670-690: sends them to OSWRCH.

700-870: increments Y and repeats for the y co-ordinate.

880-910: If that's all the co-ordinates, finish.

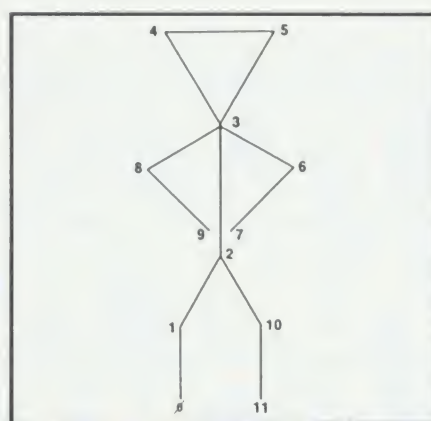


Figure 1. Each part of the body has a different number

PROCset_var Sets the main variables:

B% (Base): address of first byte of first frame, so $B\% + X \times 24$ will give the address of the first byte of frame X.

E% (End): address of first byte of last frame.

N% (Number): number of frames in use.

This procedure also sets up the display order table at &71 on, and the data for the 'standard' man in the first frame.

PROCmenu Displays menu.

G%: used when Escape is pressed. If it

equals 0 then the program was exited at the menu and it is allowed to end.

PROCshow Shows film.

C%: counter displayed on screen.

F%: first frame to be displayed.

L%: last frame to be displayed.

S%: 2 – film should be shown at fastest possible rate.

1 – single step.

0 – delay loop should come in.

D%: length of delay.

J%: records colour of man currently displayed.

PROCedit Straight away the main loop is entered, colours are returned to default and screen is cleared.

M%: number of frame being edited.

P%: starting address of present frame.

1370: if extra frames are wanted the new ones are 'topped up', filled in with copies of present frame.

1380: **S%** – current limb being moved.

O% – address of previous frame, for 'shadow'.

1400-1410: **X%,Y%** – address of co-ordinates.

x%,y% – values of co-ordinates.

1420-1430: draw man and shadow.

1460: **A%** – how fast limb moves, 4 if Shift is pressed.

1470-1550: moves point.

1560-1600: character pressed is ANDed with &DF to get the upper case value and appropriate action is taken.

1610: repeats until 'F' is typed; a new frame is wanted.

PROCinter Performs 'inbetweening', smoothing out action.

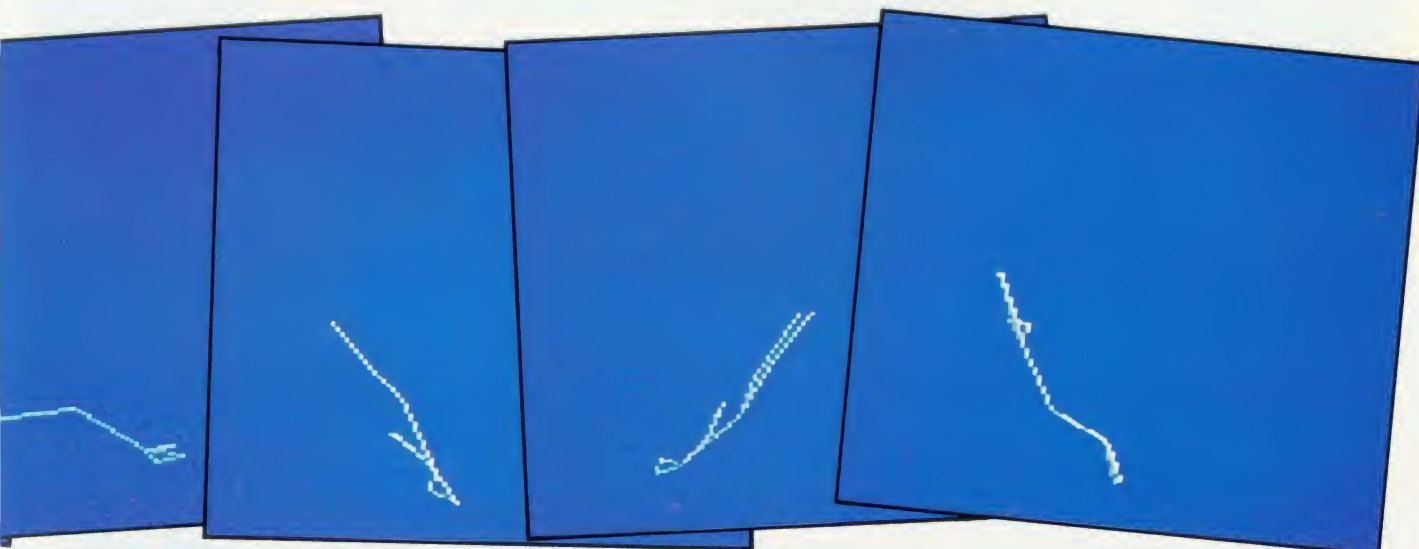
I%: number of frames to be changed.

1800: **Q%** counts through the bytes making up the frames.

1810: **D** becomes the difference between points on successive frames.

C%: counter.

1820-1850: **W%** goes through the frames to be changed. **C%** is incre-



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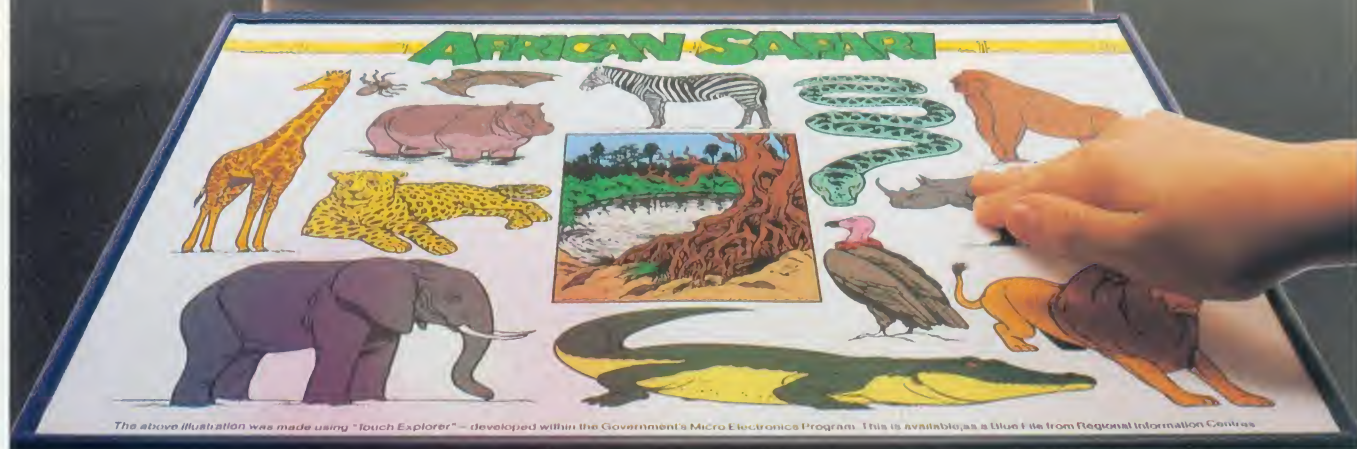
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mented and the point to be changed becomes equal to the point on the starting frame + (difference*counter).

PROCsav A\$ holds filename,X% the channel number.

PROClod Ditto.

PROCopy F% and L% equal the end frames of the source sequence,J% and K% the object sequence.

2230: if new frames are being created, N% and E% are suitably reset.

2260: if the object code is to be

reversed, the counter C% is set to -24, otherwise 24, and the starting frame is made equal to the final one.

2270:Q% counts up to the number of frames in the sequences.

2280-2310: W% goes through the points and copies them over. J%, the object frame pointer, is incremented and F% is changed suitably.

PROCsame This asks for the frame to be made equal to and then copies it into P% onwards.

PROClimb Asks for the new limb to be moved.

FNcaps Returns the uppercase ASCII equivalent of A\$.

The Animator listing is on yellow pages 98-100. You'll also find two demonstration sequences on the monthly cassette

75



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Acorn User cannot undertake to return any submissions or enter into correspondence. The decision of the Editor will be final.

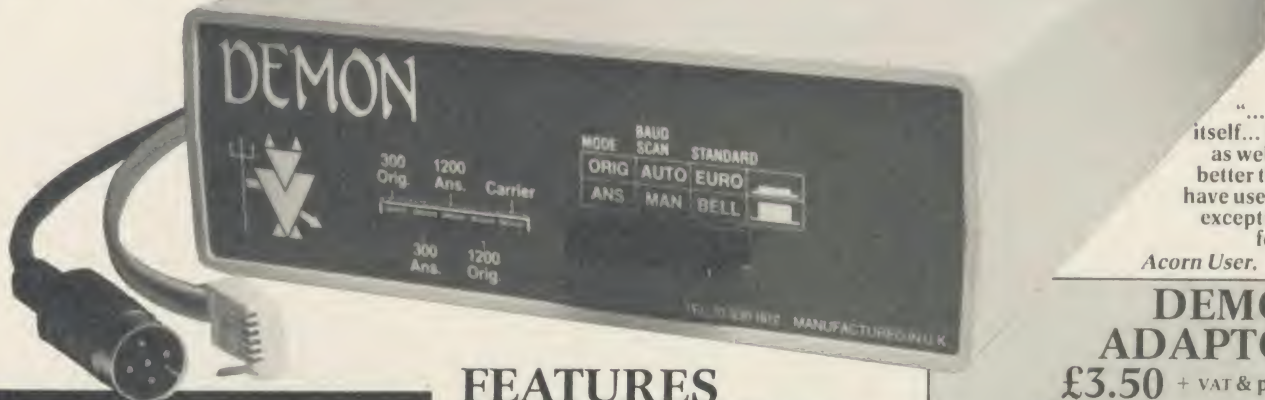


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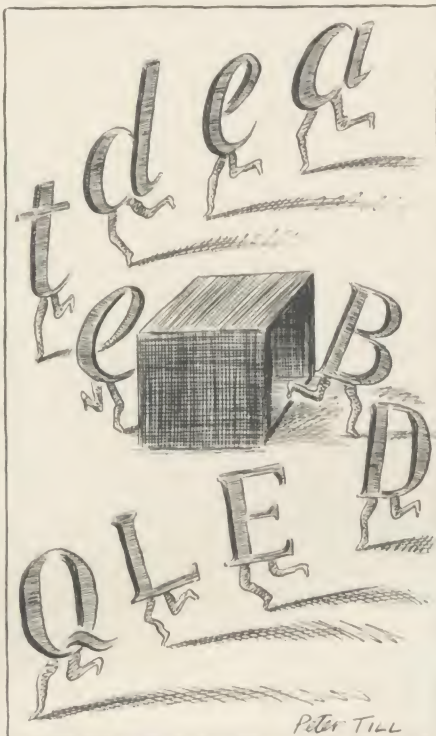
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ONE OF THE annoying little problems with the BBC micro and most others is that upper and lower case letters have different ASCII codes. For example, A has the code 65 while a has code 97. This can cause all kinds of problems with things as diverse as single key selection from menus to sort routines. This article describes two assembler routines, one of which will check each key press, changing all lower case letters to upper case before entering the character into the keyboard buffer; the other will check rapidly through a Basic string changing all lower case letters to upper case.

At first sight there may appear to be no problem using INPUT, GET or INKEY to detect only upper case letters, since the Beeb's operating system includes an OSBYTE (*FX) routine to turn Caps Lock on or off. If you enter *FX202,32 into the computer the Caps Lock light will come on. Similarly *FX202,16 will turn on the Shift Lock. Surely this should solve the problem – all the programmer has to do is ensure that there is a *FX202,32 before each INPUT or GET? Unfortunately this is not the case. True, the *FX command will turn on the Caps Lock, but then the program will sit there waiting for something to be typed in. If, before typing anything, the user inadvertently presses the Caps Lock key, Caps Lock is turned off again!

All sorts of statements can be constructed in Basic to get around this problem when using GET or INKEY but none of them is completely satisfactory, and I know of no way in which INPUT can be made to accept only upper case using Basic. For this reason I have put together two easy-to-use routines which assemble short pieces of machine code to sit in spare memory and take care of all this.

Listing 1 is a routine which intercepts any character about to enter the keyboard buffer. It checks to see if that character is a lower case letter and if it is changes it into its upper case equivalent. It can be turned on or off using *CODE or *FX136.



Many of the routines in the BBC micro's operating system are indirected through vectors. For example, when you issue an OSBYTE command the operating system jumps to a routine whose address is held in RAM at addresses &20A and &20B. So the user can direct the program to some new code simply by changing the contents of these vectoring addresses.

Listing 1 uses two of these vectors to check all characters entered at the keyboard. At addresses &22A and &22B is the address of the routine which the operating system uses to insert a character into a buffer. It is known as the insert vector. The routine in listing 1 can change the contents of this vector to point to some new code which checks each character just before it is inserted into the keyboard buffer. If it's lower case then it's changed to upper case before the new code jumps to the routine in the operating system the insert vector originally pointed to.

The other vector used by listing 1 is

the user vector at &200. The vector is used whenever *CODE or *FX136 is issued and normally it simply gives a bad command error. The listing changes the contents of this vector to point to the command subroutine in the listing, in effect adding a new command to the operating system. The command subroutine looks at the contents of the X register and decides whether to turn the lower-case checking on or off. If X = 1 (after *CODE1 or *FX136,1) then the insert vector is set to point to the checking code, while if X=0 (*CODE0 or *FX136,0) the insert vector is set to its default value.

The routine is not intended to be used as an assembly listing within a program, since this would use up too much memory. To use the routine, type in the listing and save it before you run it. Run the program and when it runs without error messages, save the assembled code with *SAVE CAPS A00+85. If you're using a cassette-based micro then you should change the value of 'code' in the listing to &C00 and when you *SAVE the program *SAVE CAPS C00+85. Whenever you want to use the code you should *RUN CAPS (or from disc simply *CAPS), to load and initialise the code. Then, if you want all input from the keyboard to be in upper case letters, use *CODE1 or *FX136,1. The computer will operate exactly as if the Caps Lock is on regardless of whether it actually is. To turn the effect off use *CODE0 or *FX136,0. Pressing Break will disable the code and it will have to be reloaded.

Listing 2 is a routine which will act on a Basic string and change any lower case letters in it to upper case. I wrote it because I was having problems with a sort routine. If you run a sort routine on a list of words which are in a mixture of lower and upper case letters then you'll find that all the words which begin with lower case letters are at the end of the list. This is because the lower case letters have higher ASCII codes than the upper case ones. To get around this problem I wrote a Basic function to check through each string for lower

case letters. This worked fine but slowed the sorting down too much – so I wrote this piece of code to do the checking, using the parameter passing ability of Basic's CALL to tell the routine which string to act on. The routine will check a string of 255 characters, the maximum length which Basic strings can be, in around one-hundredth of a second. The addresses used by this routine don't conflict with those used by listing 1 so both routines can be in memory at the same time.

When one or more parameters are passed to a machine code routine using CALL, a parameter block is set up at &600 giving information about the variables which are passed. In the case of a string the parameter block contains the address at which Basic has stored the information about the string. Listing 2 uses this information to find the address of the end of the string and then works down the string from the end; each time it finds a lower case letter it changes it to upper case.

Type in listing 2 and save it before running it. Run it and, when prompted, enter a string containing lower case letters. The program will then convert all lower case letters to upper case. The

altered string is printed out to confirm this has been done. Simple, isn't it?

PROCupper_case can be added to any program you like. At the beginning of the program you must call PROCupper_case to assemble the code. Any time you want to change a string into capitals simply use CALL upper_case,X\$ (or whatever the name is).

If you like, you can just save the assembled code as you did with listing 1. To do this load listing 2 and enter PROCupper_case to assemble the code; then save the code with *SAVE UPPER A90+30. If you do this, to use the code in a program you must put a line at its start reading *LOAD UPPER followed by another reading upper_case=&A90. You can then use it exactly as if you had PROCupper_case incorporated in the program.

The parameter block which is set up when using CALL also contains information about the type of parameters passed, that is whether string or

numeric variables. This information can be used to check that the sort of parameter expected has indeed been passed. In order to reduce the length of the code this facility is not used by listing 2. If you pass the wrong type of parameter, by for instance using CALL upper_case,A%, then your program may crash or hang up. Beware!

Listing 3 is an example of how to use the code as part of a sort routine, asking you to enter 10 words which it then sorts into order. You should also type in PROCupper_case from listing 2 or *LOAD UPPER if you saved the assembled code. Make sure that some of the words you enter are in lower case and some are in upper case. If you leave out line 270 you'll find that the list of sorted words has all the lower case words at the end whereas if you include this line the words will all be sorted, paying no attention to the case of the letters. If you look at listing 3 you'll see that before comparing two words in the list the words are first put into temporary strings, w1\$ and w2\$. This is necessary to prevent the machine code routine from acting on the actual words in the list; if it were allowed to do this it would leave them all in upper case.

Peter Gaunt's listings to change lower case letters to upper case are on yellow pages 101-103.

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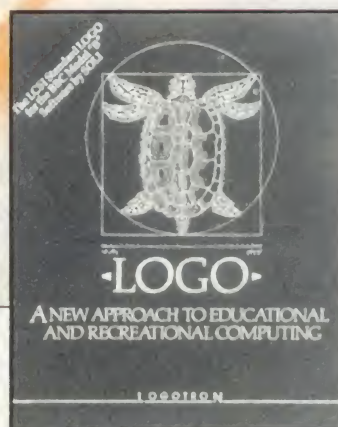
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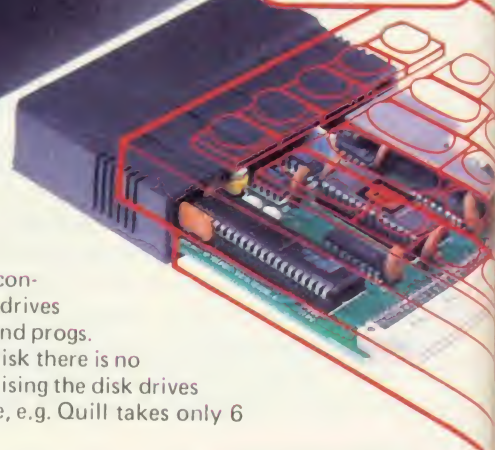
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A CHANGE OF MODE

81

Tristram Mabbs adapts his colours by interrupts program to give you more than one mode on screen

LAST month's article covered the use of interrupts to change colours during a screen scan, allowing multiple colours to be used, even if only a two colour mode has been selected. This month I'll describe an adaptation of this routine to provide mode changes at defined intervals on the screen.

Mode changing interrupts are a more specialised use of the Display List Interrupt technique than the simple colour changing routines. This is because you will need to provide your own plotting and drawing routines, or use *FX calls, to convince the VDU driver that parts of the screen have different numbers of colours.

As for last month's routines, the video ULA is accessed directly by the interrupt software, so a brief description of the mode control register is required. This is located at &FE20 and controls various functions. The top three bits determine the cursor width and so need no detailed explanation here. Bit one selects teletext output (using the SAA5050 CGEN) and is therefore ignored, as assorted hardware interlocks generally prevent mode 7 being mixed with the other modes.

Bit zero selects which of the two flashing colours for any given flashing colour is currently being displayed. This is also irrelevant for the routine except in as much as it necessitates the deselection of flashing colours unless the mode displayed at the top of the screen is the same as the mode selected when PROCsetdlis was called. If this is not the case, the top section

of the screen will flicker at the rate determined by *FX9 and *FX10 as the entire ULA control register has to be rewritten to change bit zero. The control register is write only. The other way of preventing this flickering is to use *FX154,x where x is the value listed below for the mode at the top of the screen. For instance, if the top mode is mode 0, use *FX154,156 (as 156 = &9C).

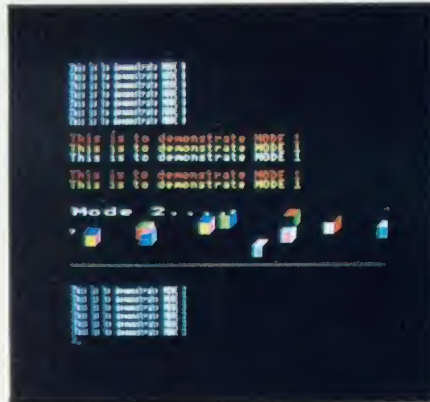
Next, bits two and three determine how many characters (note: not bytes) are displayed per line. They form a two

clear, a low frequency clock is selected, as used by modes 4 to 7. Obviously, this means that all the values written to the CRTC are not portable between these two groups of modes. As it is not possible easily to redefine the CRTC registers during a scan of the screen, modes to be mixed can be chosen from one group or the other but not both. Thus you cannot have mode 0, say, present together with mode 5, although mode 5 and mode 4 is possible.

A point to note here is that as far as this routine is concerned, there is no difference between modes 0 and 3 or between modes 4 and 6. This is because the additional line spacing is provided by the CRTC, not the ULA.

This brings us to the program. The first 28 lines are purely a demonstration. They set up the DLI routine data areas to display mode 0 followed by 1, 2 and finally 3 (or mode 4 followed by 5 and 6), with each mode having its default colours selected. PROCsetdlis is then called before a moire pattern is generated to demonstrate the different modes. Pressing any key other than Escape will then list the program to demonstrate what text looks like without the bits being translated for the different mode formats.

The main part of the program, PROCsetdlis, resides from line 10000 onwards. It requires two parameters, both addresses of blocks of data. The first block consists of a number of three byte entries, terminated by &FFFFFF. The first two bytes contain the next value to be loaded into the interrupt timer (low byte then high) where a



The demonstration program shows modes 0, 1, 2 and 3 on screen together

bit number with zero representing 10 characters per line; 1 represents 20, 2 is 40 and 3 is 80.

Finally, bit four is the important bit to note: this provides the main restriction on which modes are selected during the scan. If this bit is set, a high frequency clock is fed to the 6845 CRTC, thereby allowing the high rate of data access required by modes 0 to 3. If

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value of &260 approximately corresponds to one line of text in a 25 line mode. The third byte contains the number of the new mode to be changed to. For speed reasons, no range checking is done on this number.

The second block of data is 22 bytes long. The first two bytes are the physical colours for colour 0 and colour 1 of any two colour mode selected. The demonstration sets these to zero and seven. Then come four bytes for colours 0 to 3 for any four colour mode. Here, the demonstration routine selects colours 0, 1, 3 and 7. Finally come 16 bytes for the colours of mode 2 if selected.

PROCsetdlis itself is not very complex. It simply assembles the machine code, allows for a *TV call (see below), switches off the flashing colours and returns. The main body of the program is contained within FNassemble. The machine code first identifies the source of the interrupt. If it is a frame sync interrupt, it resets its pointer to the start of the data and calls the DLI routine to actually restore the top of screen conditions. Note that PROCsetdlis modifies the first timer value to account for the area at the top of the screen where no data is displayed. The value added (&6C8: see lines 10060 and 10070) is correct for *TV0: values for other *TV values can be calculated from this.

The DLI interrupt selects the appropriate value to write to the ULA control register from the table at line 10700. These values are as follows:

Mode	0	1	2	3
Value	&9C	&D8	&F4	&9C
Mode	4	5	6	(7)
Value	&88	&C4	&88	(&4B)

Then the appropriate colour setting routine is selected and the default colours set up from the second data table. For an explanation of these colour routines, see last month's article. Finally, the timer is set up ready for the next interrupt.

At the end of the program, two other useful routines are appended: PROCdlisoff and PROCdlison. These allow the interrupts to be deselected and reselected from within a program if the program needs to extend the DLI data. Note that the DLI data is portable between modes within the same group, but remember the difference between 25 and 32 line modes.

To use a screen where multiple modes are running, you will need to inform the operating system which area of screen you are using, as the OS will assume that all the screen is in the mode selected when you called PROCsetdlis. To do this, you need to alter six bytes in the OS VDU work-

space. The start of this workspace can be determined by using OSWORD with A=174, X=0 and Y=255. This returns the start address LSB in X and MSB in Y. Calling this address A, you will need to alter A + &A, A + &4F and A + &60 to A + &63. These locations should be set as follows, depending on the area of the screen you wish to access:

- &A Number of characters (not bytes) per line -1 (eg 19)
- &4F Number of bytes per character (eg 32: 4 wide x 8 high)
- &60 Number of colours per mode -1 (eg 15)
- &61 Number of pixels per byte -1 (eg 1) or 0 for text only
- &62 Graphics left mask
- &63 Graphics right mask

The two graphics masks contain a pixel set in the highest colour possible in the leftmost (&62) or rightmost (&63) pixel position. For example, for two colour modes, these bytes contain &80 and &01, and for mode 2, &AA and &55. Examples in brackets are for mode 2.

When using the routine, there are a couple of general points to remember. First, you may notice slight flicker when running the program. This is caused by the DLI interrupts not having priority over the OS. To cure this totally, a re-entrant DLI and operating system interrupt routine would be required. While this is possible, it makes the software operating system dependent, as calls have to be made into the OS ROM itself rather than through the vectored calls in PAGE &FF. Advanced programmers may like to reduce the problem by disabling interrupts they are not using, thereby reducing the chance of conflict. The flicker becomes more pronounced as more DLIs are added, as the chance of interrupts clashing increases. So select your screen layout with care.

Secondly, if you are running very short of memory, you can use CLEAR to remove all the variables after using PROCsetdlis, then re-dimension the three arrays (the two containing the DLI data and the one containing the machine code: the length of this array is given by FNassemble - 0,&C000). They will then cover the same area of memory as the original arrays and these originals will be preserved, but all other variables will have been deleted.

Finally, here are a few ideas for further experimentation. It is possible to redefine the CRTC registers part way down a screen. This makes mixing of medium (modes 4 to 7) and high (modes 0 to 3) resolution modes possible but more interestingly, allows the 'start of screen memory' pointer to be changed part-way down a screen. This means that the screen data does not have to be one continuous block, so

areas may be hardware scrolled individually, or repetition of data may occur. The latter technique provides considerable memory savings on games, for example, requiring a couple of layers of clouds where one cloud layer may be slightly offset and redisplayed many times.

The way to change the CRTC registers is to trick the CRTC into thinking that its screen is the length of the area of data to be displayed next. The frame sync is configured as a line sync and the new register values are set before the end of the 'frame' so they take immediate effect. Thus the CRTC completes several 'frames' for each complete TV frame.

Entering the program

The program can be broken down into three sections: the demonstration section (10 to 280), the DLI core routine and utilities (10000 to 10090 and 10730 to 10760) and the assembly section. To enter the program, first enter the following short routine:

```
10 Data=&4000
20 Data1=Data:Data2=Data
30 FOR Mode=0 TO 2
40 L=FNassemble(0,&4000)
50 L=FNassemble(2,&4000)
60 B=0
70 FOR A=&4000 TO &4000+L-1
80 B=B+?A
90 NEXT A
100 PRINT"Checksum is :";B
110 NEXT Mode
120 END
```

This is the same program as used for the colour DLIs, so if you saved it last month, you can simply re-load it. Then type AUTO 10100 and enter the assembly language section. If you now type Run, three checksums, all 29315, should be printed. If so, you can now delete lines 10 to 120 and enter the remainder of the program. If not, or if an error occurs, check the listing and correct the error. Note that the REM statements at lines 10120, 10180, 10250, 10280, 10340, 10420, 10510 and 10650 are not essential and can be shortened or ignored. Where the REM statement \does not start the line, enter the line up to the REM statement before deciding whether to shorten or ignore the message. With the entire program entered, **save the program before running it in case an error still exists, as an error in the interrupt routine may corrupt the entire program.**

In Colours by Interrupts in last month's issue the three checksums should have read 20203, 21428 and 19413.

Tristram Mabbs' listing for modes by interrupts is on yellow pages 104-105.

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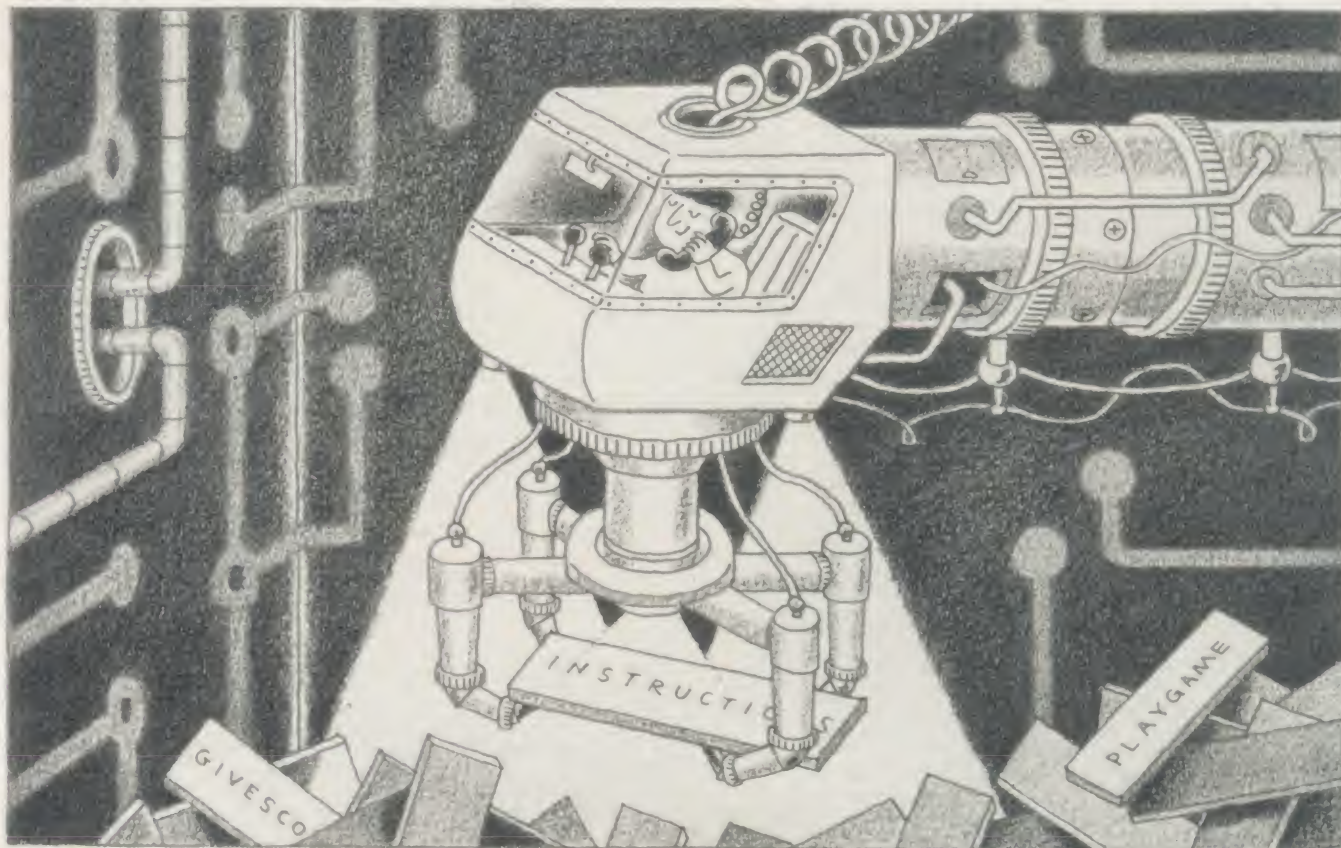
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PRIVATE FUNCTIONS

Patrick Quick reveals how to implement programming structures not usually available in BBC Basic

IN BASIC you can use a 'computed GOTO' or 'computed GOSUB' using the keyword ON. This selects the line number automatically from a list, eg:

```
ON X GOSUB 560, 670, 345, 8765
```

This is equivalent to

```
IF X = 1 GOSUB 560
IF X = 2 GOSUB 670
IF X = 3 GOSUB 345
IF X = 4 GOSUB 8765
```

This is useful for producing a neat, clear choice of routine but it uses line numbers, which are not very easy to remember. It would be better to have a computed procedure call such as:

```
ON X PROC instructions, playgame,
givescore
```

which would choose PROCplaygame if X = 2 etc. Unfortunately this is not available in BBC Basic but it is possible to invent a 'computed function call'.

What FNon does

The function FNon, described here, picks the chosen function name from a string containing the list of names

separated by commas, eg, "instructions,playgame,givescore". This string is passed as an argument to FNon together with a number which selects the required function from the list, eg:

```
20 A = FNon("instructions,playgame,
givescore",X)
```

This is equivalent to

```
IF X = 1 A = FNinstructions
IF X = 2 A = FNplaygame
IF X = 3 A = FNgivescore
```

How it works

Version 1 of FNon (listing 1) takes two arguments. The first is a string containing a list of function names separated by commas.

The second argument is a number indicating which one of these functions is required. The chosen function is selected by looking through the string for commas and splitting off the separate function names while counting down to zero (line 1040).

Variable I holds the position of the next comma in the list. This is initialised to zero so that I + 1 always points

to the beginning of the next function name. Subsequent commas are found by the INSTR function on line 1060. This function searches for a given string inside another string. If it is there, the value returned is its starting character position, eg,

```
INSTR("ABCDEFGH", "DEF")
```

gives the value 4.

Line 1060 searches A\$ + "," rather than just A\$ when looking for "," with INSTR. This has two advantages. The first, and most important, is that it may be used safely with Basic 1, which has a bug in the INSTR routine. This bug causes trouble when searching in a short string for a longer string (User Guide page 281). A\$ + "," is always at least as long as "," so the problem is avoided. (I usually use this trick with INSTR so that my programs will work on all Bees.)

The second advantage is that the result given by this version always points to the end of the next function name, even when there are no more commas. This makes the rest of FNon simpler to write.

If the count has not yet reached zero and there are still some function names left (line 1070) then the search is repeated and the first name is stripped off the front of the list (line 1050). When it is found, the appropriate function name is put in an EVAL expression at line 1090. This is why you can only use functions – you cannot EVALuate a PROCedure.

(If the routines you are using do not need to return a function value then you must just return a 'dummy' value which can be ignored. In other words, to turn a procedure into a function replace PROC by FN in the definition, replace ENDPROC by =1 and each time the procedure is called replace PROC thingy by X=FNthingy, where X is some variable you are not using elsewhere.)

This method allows any number of function names to be included (up to the maximum you can fit in a string, ie, 255 characters).

With ON...GOTO or ON...GOSUB you can pick up illegal values of X by using ELSE (although this reveals another bug in Basic 1 – see User Guide page 309), eg:

```
ON X GOTO 230, 670, 500 ELSE GOTO 800
```

If X is not 1, 2 or 3 then the program jumps to line 800. FNon does the same by returning the value FALSE (zero) if out of range (lines 1010 and 1080), while the functions chosen (FNinstructions, etc) should always return a non-zero value.

For another practical example, consider this use of FNon to choose an operation in a wordprocessing program by means of a single key:

```
100 IF FNon ("insert,delete,edit,finish",INSTR("IDEF",GET$)) ELSE VDU 7: GOTO 100
```

Line 100 uses version 1 of FNon to select FNinsert, FNdelete, FNedit or FNfinish according to the key press (I, D, E or F). If some other key is pressed then a beep sounds and the line is repeated.

Version 2

This (listing 2) allows the passing of two extra arguments, one string and one numeric (other combinations can of course be used). The parameters must be the same types for each of the selected functions. The parameters (P\$ and P) are included in the definitions of FNon2 and of the chosen functions and are also included in the call of the chosen function (see amended line 1090).

Both of these versions work on Basic 1 and Basic 2.

Note that ON...GOTO and ON...

GOSUB round down fractional values of the selector. In other words, if X is 2.6 then the second line number is chosen. FNon has been written to give the same

effect. If you want to reject fractional values, simply include another test in FNon:

```
1005 IF A <> INT(A): = FALSE
```

```
10 INPUT "Which ? "X
20 IF FNon("instructions,playgame,givescore",X) ELSE PRINT "Out of range"
30 GOTO 10
1000 DEF FNon(A$,A)
1010 IF A<1 : =FALSE
1020 LOCAL I:I=0
1030 REPEAT
1040 A=A-1
1050 A$=MID$(A$,I+1)
1060 I=INSTR(A$+","+",")
1070 UNTIL A<1 OR I>LEN A$
1080 IF A>=1 : =FALSE
1090 =EVAL("FN"+LEFT$(A$,I-1))
```

Modules for version 1

```
3000 DEF FNinstructions
3010 PRINT "Press lots of keys quick ly."
3020 =TRUE

3100 DEF FNplaygame
3110 PRINT "ZAP! ZAP! ZAP!"
3120 =TRUE

3200 DEF FNgivescore
3210 PRINT "You lose."
3220 =TRUE
```

Listing 1. Version 1 of FNon

```
10 INPUT "Which ? "X
20 IF FNon2("instructions,playgame,givescore",X,"testino",6) ELSE PRINT "Out of range"
30 GOTO 10
1000 DEF FNon2(A$,A,P$,P)
1010 IF A<1 : =FALSE
1020 LOCAL I
1030 REPEAT
1040 A=A-1
1050 A$=MID$(A$,I+1)
1060 I=INSTR(A$+","+",")
1070 UNTIL A<1 OR I>LEN A$
1080 IF A>=1 : =FALSE
1090 =EVAL("FN"+LEFT$(A$,I-1)+"("+P$+",""
```

Modules for version 2

```
3000 DEF FNinstruction$(X$,X)
3010 PRINT "Using first routine"X,X$
3020 =TRUE

3100 DEF FNplaygame(X$,X)
3110 PRINT "Using second routine"X,X$
3120 =TRUE

3200 DEF FNgivescore(X$,X)
3210 PRINT "Using third routine"X,X$
3220 =TRUE
```

Listing 2. Version 2 of FNon



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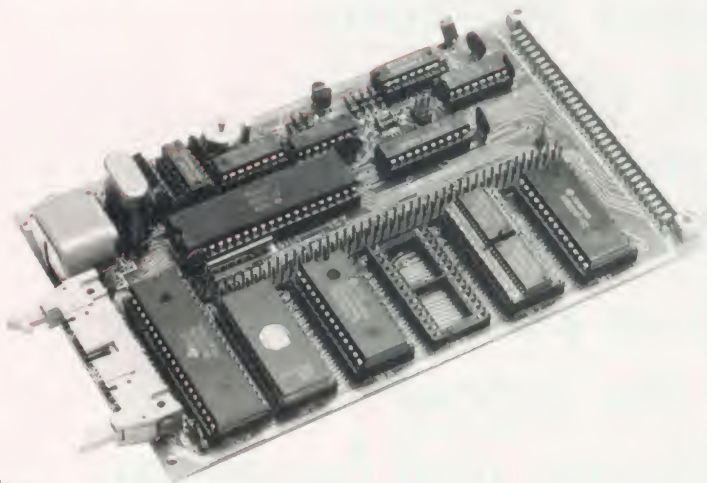
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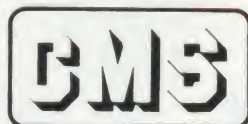
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91



6502 second processor for the Beeb

JANUARY

WINNERS

JANUARY'S competition produced about 300 entrants, about 85 per cent correct. It wasn't an easy one so here are the answers.

Problem 1: 232324

Problem 2: 37

Problem 3: 901 or 28, depending on your view of leading zeroes – we hadn't specified.

Day 1: Alex 2 is for real

Day 2: Alex 1 is for real

Day 3: Alex 1 is for real

Day 4 was (deliberately) a *confusione!* The two statements are either both true or both false, which is logically impossible. Either way, whichever one you chose made no difference. Correct answers were 467425 and 465623 as well as the intermediate position of those who insisted they couldn't do anything on Day 4! The equivalent numbers for those who opted for number base 28 in problem 3 (a small minority) were also accepted.

The winners of the Quinkey alternative keyboards have been notified by post and were M Brewster of Birmingham, Lars Guldberg of Norway and Andrew Mitchell of Thetford, Norfolk.

BUMPER COMPETITION

THIS MONTH'S competition is more difficult than usual – but then the prize is more mouthwatering. The winner can choose between a 6502 second processor for the BBC micro or a Plus 3 for the Electron – so please specify which you'd prefer on your entry.

Scattered in a random order through the pages of this month's *Acorn User* are 11 separate problems for you to solve. However, you don't need to be a computer genius to get the answers – some require a little mathematical ability, others a talent with words and others the energy to seek out reference books.

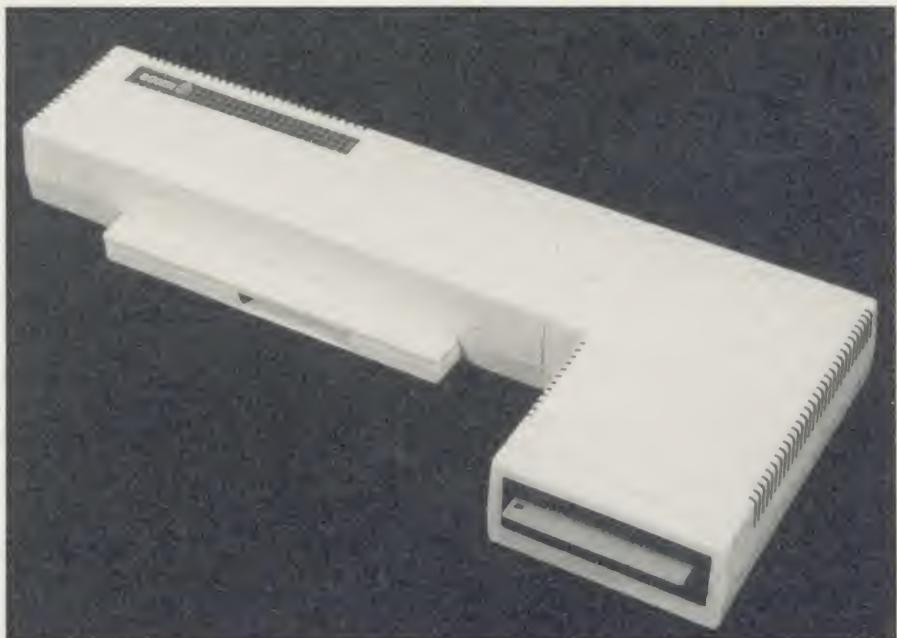
In addition there are two programs you have to decipher which form part of the competition. One of them gives

hints and tips about some of the more obscure clues; the other tells you about how to put the final answer together.

All the problems have an answer (in base 10 arithmetic), and if you find your final, overall answer isn't less than seven figures and exactly divisible by 11 you've done something wrong!

Please send your answers on a postcard to arrive not later than Friday, June 7 to May Competition, *Acorn User*, Redwood Publishing, 68 Long Acre, London WC2E 9JH. Remember to state which micro you own.

Please do not telephone us with queries about the competition. If you are in genuine confusion follow common sense rather than imagine we are being 'clever-clever'. The editor's decision is final.



Acorn's Plus 3 disc interface for the Electron

BACK ISSUES

92

1. July/August 1982 The first issue. Articles on drawing techniques. The BBC Computer Programme. Machine code graphics. Questions & answers. Hints and Tips. Sound. Interfacing scientific instruments. Dumb Terminals for 0.1 machines. Disc drives. Econet in schools.

2. September Ceefax telesoftware. Beeb in business. Mailing list. Simple files. 30-Hour Basic course. Art on a micro. Music. BBC micro as a key-



board. Extra Atom commands. BBC Basic board. ULA design. Teletext graphics. Machine code graphics. Analogue input. Schools training. 0.1 cassette bug patch.

3. October Electron details. BBC TV series—confessions. Two Epson graphics dumps. Seikosha GP100 dump. Worldwide networking for BBC micro. Garbage handling. Voice ROMs. Sound pitch envelope. Moving graphics. ZX printer for Atom. RGB colour separations for Atom. Biofeedback. Book reviews.

4. November Teletext. Second BBC TV series. Machine code series 1. Programming forum. *Trek III*. Speeding up graphics. Bomber game listing. 7-tone Epson graphics dump. Atom graphics manipulation. Dumb terminal for 0.1 machine. Firework graphics. Editing tips.

£1-25

5. December BBC TV in schools. Machine code 2—registers. Programming forum. Program generators. Carols. Hints & Tips. Logo and Turtle graphics in schools. Introduction to procedures. Software review. Atom word processing. Toolbox review. 16-colour graphics on model A. Sorting. Sound envelope design.

6. January 1983 MEP school launch. *FX commands for sound. Second BBC TV series. Machine code 3—two pass assembly. Disc drives for the Beeb. Programming forum. Program protection. Micros in schools—new series. Commodore Pet printer used with Beeb. BBC programs written on an Atom. Extra Atom memory.

7. February 1 MHz bus examined (4). 3D Atom graphics (3). Atom BBC Board reviewed (3). Machine code 4—memory (5). BBC Computer Literacy update (1). Atom error handling (2). Micros in schools 2—getting organised (6). Hints and Tips (4). Beeb Forum (3). Reviews of *Wordwise* (2) and the Amber printer (1).

8. March Chess on the BBC micro (3). Sound on the Beeb (4). Printers for beginners (4). Atom analogue converter (2). Schools 3—micros and maths (6). Machine code 5—indirect addressing (3). DIY lightpen (5). MEP's *Microprimer* review (2). Atom Ross toolkit review (1). Beeb Forum (2). Assembly language and Pascal book reviews (2).

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9. April *Hexangle* game listing (4). Bach on the Beeb (4). Hints & Tips on disc drives (4). Machine code 6—the CALL statement (4). Interfacing the 1 MHz bus (3). Schools 4—young children and micros (6). Graphics listings (2). Printers for beginners 2 (4). Reviews of BCPL, educational software and Atom software (3).

10. May Review of Basic II(1). Graphics listings(1). New *FX calls in OS1.2(1). Colour mixing on the Beeb(4). Jazz, blues and folk on the BBC(6). Schools 5—language development(6). DIY Beeb interface box(4). Atom sound board(5). A to Z of printing: how to get going(4). Hints and Tips: PROCs, discs and FNs(5). Printer, software and book reviews.

11. June Techniques series—sorting(2). Hints and Tips: 50p network(5). Drawing techniques and CAD(5). Machine code: interrupts(6). Schools 6—information technology. Atom Forum. Beeb Forum. Printers—write your own graphics dumps(4). Comparative review of *View* and *Wordwise*(3). Three graphics packages reviewed(3). Test of *Acorn User's* interface box(4).

12. July Techniques—hash tables(2). Hints and Tips: logic made easy(5). Recursion and graphics(6). Handling strings(3). Two ideas for passing variables(2). Beeb aids the blind(2). DIY second keyboard(5). Beeb Forum. Sounds on the Atom(2). Hardware, firmware, software and book reviews. Atom Forum.

13. August Printer graphics and dumps(2). Techniques—Tree structures and sorting(2). All the fun of the fair(7). 40/80 disc copier(2). Colour painting(5). Basic II: random access files(2). Screen dumps for Olivetti, Centronics and Seikosha(5). Atom strings(3). Reviews of Tandy CGP115 printer, five educational packs, A to D converter.

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14. September Techniques—Ink-blots and mazes. Painting by lightpen. DFS space explored. Beeb Forum. *Mega*



Monsters game listing. Machine code graphics dumps. Atom Forum. Atom cassette recorder check. Reviews of Atom RAM boards, Cumana disc manual, *Logo* for schools, Hobbit floppy tape and books.

15. October Women and computing. Techniques—random numbers. Review of Computer Concepts' *Beebcalc*.



Fractal graphics. 57 files on 40 & 80 track discs. *Vampire* game listing. Beeb Forum. Assembly code controls tab key. Osfile merging. Atom future. Atom verify routine. Reviews of *Vu-Type*, Procyon Atom book, Epson FX80, Teletext adapter, disc drive, software.

16. November Techniques—impossible problems. Contour graphics. Connecting two Beebs together. XREF: sorts & lists variable, function and procedure names. Assembler utilities in Basic II, OS, VDU. *FX, OSBYTE calls—pull-out poster. Disc overlays. Adding extra Atom commands. Reviews of 7 educational packs, Atom ROM, books, games.

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17. December Random graphics. Animated graphics in colour. Techniques—graphs. Hints & Tips. Universal printer

dump. 6522 connected to the Electron. Saving machine code. Beeb Forum. Graphics pull-out poster. Index: July 82–July 83. Forum Extra: EQUUS. BBC helps the disabled. Schools—data processing. Transferring data between Beebs, Atoms... or Pets. Atom block demolition utility. Atom disassembler program. Reviews of software, books, educational programs from Chalksoft.

18. January 1984: Games special issue Techniques—graphs part 2. Stacks and queues, Basic and languages. Hints & Tips. Voice chip revealed. How to write games. Electron interfacing. Beeb Forum. Life graphics routines. *Defencecom* game listing. *The Train* game listing. Machine code graphics. Where to put machine code. Schools—handling data. Juki daisywheel printer examined. Atom Forum and adventure.



Reviews of utilities, software, *Beeline* wordprocessor, educational packages, two chess programs.

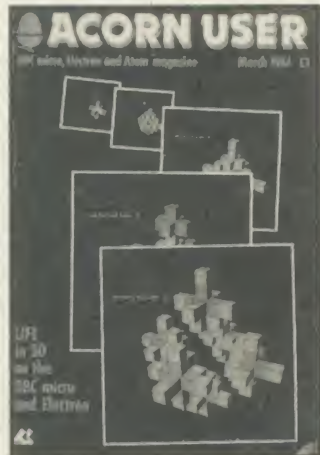
19. February: Adventures special issue Techniques—efficient sorts(3). PROC for a numeric keypad on the Beeb keyboard(1). 12 graphics listings(1). Random access filing on disc(5). Locking files(2). MCP40 printer/plotter looked at(5). Hints & Tips(3). Beeb Forum(2). Make discs readable on 40 and 80 track drives(4). Screen memory



organisation(3). Hints on adventure design(3). Adventure action(4). Adventure ideas in computer language(2). Text compression(2). Word-crunch-

ing(4). VIA chip on Electron to drive a parallel printer(3). Atom Forum(2). Schools – simulation packages(4). Reviews: *Disc Doctor*, Leasalink's DFS upgrade, Hitachi's microdrive system, Solidisk's sideways RAM board, software.

20. March Utility: timing routine. Fractals. Teletext and mode 7 dump. ROMs reviewed. Hints & Tips. Beeb Forum. Add sounds to your games. Learn Lisp



1. Cube graphics. Printer driver for View. Basic II from Basic I. Beeb's ADC chip. Atom Forum. Listing formatter for the Atom. Atom 'bytes free' routine. Schools – test of *Factfile*. Keyboard skills. Amcom DFS v Acorn DFS. Reviews: *Beebpen* wordprocessor, Atom expansion system, software, books.

21. April Beeb graphics on TV(3). 6845 chip explored(3). Advanced filing systems(1). Lisp 2(4). Hints & Tips(3). Beeb Forum(4). Choose disc tracks to copy(4). Function key editing(4). Teletext dumps(3). CES scrutinised(3). Passing variables(2). Computer Concepts' graphics ROM(4). Schools – simulations(4). Calculating Easter dates(3). Better programming(3). Atom Forum(2). Atom ROM routines(5). Converting BBC to Atom Basic(2). Three printers compared(2). Reviews: software, Aries B20 RAM board, *Toolkit*, Monitors.

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22. May Bitstik graphics system. Hints & Tips. 6502 second processor examined. Lisp 3. Beeb Forum. Disc utility to keep track of available space. Statistics. Pattern graphics. OSWORD explained. 4 colour graphics listings. Second-hand



disc drives. Education – do girls get a fair deal? Atom Forum. BBC to Atom

Basic 2. Reviews: British Micro's Grafpad, *Edword* wordprocessor, 4 sprite generators, Opus microdrive, Beasty, software.

23. June Acorn Z80 second processor(3). Forth(2). Graphics to brighten up your games(2). Soft Pottery graphics(4). Go faster and save memory space(3). Rapid search and load routine for tapes(2). How the Beeb and Electron work 1(3). Business: reviews and how to gently enter office computerisation(4). Education – adult literacy(3). Dumping Atom programs on the BBC(2). Atom Forum. Software copyright laws(2). Hints & Tips(4). Techniques – B-Trees(3). Beeb Forum(2). Reviews of monitors, printers, books, software, adventures, EPROM programmer.

24. July Communications: the future; portable micros; modems & electronic mail. Hints & Tips. First Byte: using your micro. Beeb Forum on Basic. How it works II: slow down the Beeb. Business: Acorn's Z80 software, Starbase ROM. Education: a look at Edfax, how to teach facts. Atom Forum. Converting BBC to Atom Basic. Reviews:



Electron Plus-1, Solidisk's 128k RAM board, three IEEE interfaces, Canon colour and Brother printers, ADE ROM.

25. August Downloading the weather. Teaching tots: keyboard overlays, activity board. First Byte: writing & debugging programs. Hints & Tips. Beeb Forum: 6502 second processor & Tube tips. How it works III: random numbers. Business: Plan software for Z80. Atom Forum: avoiding errors. Reviews: 3 drawing packs, Torch Unicomm, MCP's Interbeeb, software plus for Micronet.

26. September Decoding radio signals. First Byte: getting moving. Hints & Tips.



Education: problem solving. Sprite design and animation part I. Beeb

Forum: fastest dump. Write your own disc formatter. How it works IV: random number generator. Business: Nucleus software for Z80, accounts. Atom Forum, ? and !. Reviews: Torch Unicorn, Quinkey, Parfitt plotter, Turbo compiler, Multi-aid.

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27. October The BBC and space. First Byte: noises on the Elk. Hints & Tips. Sprite design and animation part II. Programming the 8271. Sorting techniques. Diagnosing ills in the Beeb. Beeb Forum: NFS update. Education: report on government scheme, review of Microtext. Atom: wordprocessor. Communications: bulletin boards. Reviews: Basic utility ROMs, sideways ROM sockets, Bearsoft's Editor, Watford's Buffer & Backup, Ampersand's Colour module.

28. November Acorn's ABC range. First Byte: drawing. Hints & Tips: 3D-effect printing. Sprite design and animation part III. Floating point variables. ROM juggler. *Micro Live*. Education: news, Edword in the classroom, school quiz. Atom forum: hardware, the Auto command. Reviews: Six turtles and buggies. Toad's extension socket, Watford's Speech Synthesiser and



Beebfont ROM, BBtype, Romex 13 ROM board, 3 language coaching packs, two graphics tablets.

29. December Guide to bar codes. First Byte: text & graphics windows. Hints & Tips: control codes for Epsoms. The

Domesday project. Low-cost keyboard for the Beeb. Dumping games' screens. Speed up your micro. DIY database. Education: news, science quiz, review



of the Dudley suite of software. Atom: Forum, build a ROM pager, competition. Reviews: 6 databases compared, part I of lightpens, Acornsoft's Logo and Pascal, best games of 1984.

30. January 1985 Games special: Quad-line, Picture Puzzle, musical tunes. Colourful graphics. Hints & Tips. Operation



Raleigh report. Setting up your own teletext database. Second processors examined. Education: news, activity board revisited. Reviews: 6 wordprocessors compared, three astronomy packs, software for lightpens.

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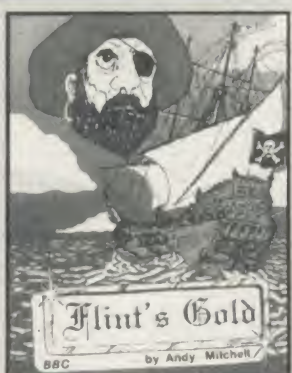


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SWORD MASTER is one of the few two-player games around, and is designed for joystick or keyboard. It is based on the fencing rules written in 1190 by Herman von Salza for the Deutscher Ritter Order of Teutonic Knights.
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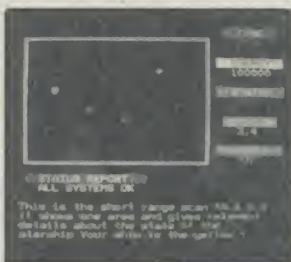
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MARS MISSION: Mars is your destination. The mission – to rescue fellow astronauts stranded on the bleak, hostile surface below. But between your orbiting space station and the safety of the colony's landing pads are the deadly meteor showers and marauding aliens.

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Craze Caverns, Telescope, Mars Mission + Astro Blaster and Grafpak are available for the BBC micro at only £7.95 (cassette), £10.95 (40/80 disc)

GRAFPAK

GRAFPAK is a mode 7 graphics utility incorporating machine code routines not available in other packages, eg Draw, Plot, Fill. It's easy to use and provides a useful tool for the construction of advanced text graphics for games, or any other software.

PLUS 3D MAZE – a game which not only provides an excellent demonstration of Grafpak and its speed, but also hours of fun.

Machine code routines in both programs can be adapted for your own applications, making the package extremely good value for money.

TELLSCOPE

TELLSCOPE is an early learning package for 2 to 10 year-olds which provides a kaleidoscope of words, pictures and music. It is designed with options to test word/picture recognition and association, as well as memory and speed, and includes upper or lower case text. These options make it suitable for a wide range of ages, and for use with or without adult supervision. Although the application is serious, the emphasis is on fun, and to add to this a selection of nursery rhyme tunes is played while the program runs.



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Listing 1. D Webb's short routine to display teletext codes

```
10 REM Listing 1
20 FOR N=160 TO 255
30 PRINT "Character ";N;CHR$(146);CHR$(N)
40 A=GET
50 NEXT N
```

Listing 2. C J Davies' program to select no filing system

```
10 REM Martin Phillips
20 REM Hints & Tips
30 REM BBC & Electron
40 REM Acorn User May 1985
50 :
60 FOR opt=0 TO 2 STEP 2
70 P%=&900
80 [OFT opt
90 .ctfs CPY #0:BNE nofs
100 .ocfl CMP #0:BNE nofs
110 .zacc LDA #0:RTS
120 .nook SEC:RTS
130 .vfsc CMP #3:BEQ badc
140      CMP #6:BCC nofs
150      CMP #7:BNE exit
160      LDX #0:LDY #0
170 .exit RTS
180 .nofs BRK
190 ]
200 $P%=CHR$&C0+"No filing system"+CHR
    $0
210 badc=P%+18:$badc=CHR$0+CHR$&FE+"Ba
d command"+CHR$0
220 NEXT opt
230 A%=6:CALL !&21E:      REM warnin
g of changing vectors
240 A%=143:X%=15:CALL&FFF4: REM servic
e call
250 :
260 FOR I%=&213 TO &21F STEP 2:?I%=9:N
EXT I%
270 ?&212=nofs: REM OSFILE -no operati
on permitted
280 ?&214=ctfs: REM OSARGS -only able
to return current FS (=0)
290 ?&216=nofs: REM OSBGET -no operati
on permitted
300 ?&218=nofs: REM OSBPUT -no operati
on permitted
310 ?&21A=nook: REM OSGBP8 -no operati
on permitted (carry set)
320 ?&21C=ocfl: REM OSFIND -no operati
on permitted
330 ?&21E=vfsc: REM FSCV  -only retur
n 0 as file handle
```

```
- . --- --- . . - . . . . - . . . . . - . . . . .
. . . . - . . - . . - . . . . - . . - . . . .
```


See 'Cartoons by Computer', page 72

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TWO demonstration films are contained on the monthly listings cassette and will also be available on Micronet 800 towards the end of April. Due to their size and the problems involved in entering data we are unable to present them in this issue of *Acorn User*. However this should not prevent you from designing your own films, using the program as instructed.

The first demonstration is the file "DEMO", which shows a character performing a series of somersaults.

The second file is called "RUN" and depicts the character running.

Because of the size factor, DEMO can only be run in Mode 5 on a disc-based machine. To load RUN for

showing in Mode 1 on a disc-based machine, PAGE must be set to &1400 before loading *Animator*, ie:

```
PAGE = &1400
NEW
CHAIN "ANIMATE"
```

Electron Plus-3 users will not be able to lower the setting of PAGE and will therefore only be able to use DEMO and RUN in Mode 5.

When showing a film sequence, the current frame number is displayed in the top left-hand corner of the screen. If you wish to remove this, then simply delete line 1140 from the listing.

```

10 REM Animator
20 REM Joe Faith
30 REM For BBC and Electron
40 REM (C) Acorn User May 1985
50 :
60 ON ERROR GOTO 2730
70 REPEAT
80 CLS:INPUT""Enter mode(1 or 5)";M%
90 UNTIL M%=1 OR M%=5:MODE M%
100 PROCset_up
110 PROCset_var
120 PROCmenu
130 END
140 :
150 DEF PROCmenu
160 REPEAT:G%=0:CLS
170 PRINT""1:Show film"
180 PRINT""2:Edit film"
190 PRINT""3:Load new film"
200 PRINT""4:Save present film"
210 PRINT""<ESCAPE>:Quit"
220 G%=VAL(GET$)
230 IF G%=1 PROCshow
240 IF G%=2 PROCedit
250 IF G%=3 PROCload
260 IF G%=4 PROCsave
270 UNTIL eternity
280 ENDPROC
290 :
300 DEF PROCset_up
310 FOR Q%=0 TO 2 STEP 2:P%=&B00
320 IOPTQ%
330 .man
340 LDX #0
350 .nextlimb
360 INX
370 LDA #25
380 JSR &FFEE
390 LDA &70,X
400 CMP #100
410 BEQ move
420 LDA #5
430 JSR &FFEE
440 CPX #100
450 BNE coords
460 .move
470 LDA #4
480 JSR &FFEE
490 INX
500 .coords
510 LDA &70,X
520 TAY
530 LDA (&84),Y
540 ASL A
550 STA &8E
560 LDA #0
570 ADC #0
580 ASL A
590 STA &8D
600 LDA &8E
610 ASL A
620 STA &8E
630 LDA &8D
640 ADC #0
650 STA &8D
660 LDA &8E
670 JSR &FFEE
680 LDA &8D
690 JSR &FFEE
700 INY
710 LDA (&84),Y
720 ASL A
730 STA &8E
740 LDA #0
750 ADC #0
760 ASL A
770 STA &8D
780 LDA &8E
790 ASL A
800 STA &8E
810 LDA &8D
820 ADC #0
830 STA &8D
840 LDA &8E
850 JSR &FFEE
860 LDA &8D
870 JSR &FFEE
880 CPX #18
890 BNE nextlimb
900 RTS
910 J
920 NEXT Q%
930 ENDPROC
940 :
950 DEF PROCshow
960 CLS
970 F%=0:C%=0:L%=N%:S%=2:D%=0
980 REPEAT
990 INPUT""Enter delay : "A#
1000 UNTIL VAL(A#) >0
```



```

1010 INPUT "Single step (y/n)";A$
1020 IF FNcaps(A$)=89 S%=1 ELSE S%=0
1030 INPUT "Entire film (y/n)";A$
1040 IF FNcaps(A$)=89 GOTO 1100
1050 REPEAT
1060 CLS:PRINT "Number of frames:";N%
1070 INPUT "Enter first frame"F%
1080 INPUT "Enter second frame"L%
1090 UNTIL F%>0 AND F%<L% AND L%<N%
1100 CLS:C%=F%:F%=B%+F%*24
1110 L%=B%+L%*24
1120 J%=1:VDU 19,J%,0;0;19,2,7,0;0;
1130 FOR Q%=F% TO L% STEP 24
1140 PRINTTAB(0,1);C%
1150 GCOL 1,J%:!"84=Q%:CALL man
1160 VDU 19,J%,0;0;19,3-J%,7,0;0;
1170 GCOL 2,J%:!"84=Q%-24:CALL man
1180 VDU 19,J%,7,0;0;19,3-J%,0;0;
1190 J%=3-J%:C%=C%+1
1200 IF S%=2 GOTO 1240
1210 IF S%=1 A$=GET$
1220 TIME=0
1230 REPEAT UNTIL TIME>D%
1240 NEXT Q%
1250 PRINT"Press key for Menu";
1260 A$=GET$:ENDPROC
1270 :
1280 DEF PROCedit
1290 REPEAT
1300 CLS:VDU 20
1310 REPEAT
1320 PRINT "Number of frames-";N%
1330 INPUT "Which frame";M%
1340 UNTIL M%>=0
1350 P%=B%+M%*24
1360 IF P%>HMEM-24 PRINT"NO ROOM!":GOTO 1330
1370 IF P%>E% PROCTop
1380 S%=0:D%=P%-24
1390 REPEAT:CLS
1400 X%=P%+S%*2;x%=?X%
1410 Y%=P%+S%*2+1;y%=?Y%
1420 IF M%>0 GCOL 0,1:!"84=D%:CALL man
1430 GCOL 0,3:!"84=P%:CALL man
1440 PRINT"Present frame-";M%
1450 C%=GET
1460 IF INKEY(-1) A%=4 ELSE A%=1
1470 x%=x%+(C%=136)*A%
1480 x%=x%-(C%=137)*A%
1490 y%=y%+(C%=138)*A%
1500 y%=y%-(C%=139)*A%
1510 IF x%>255 x%=255
1520 IF y%>255 y%=255
1530 IF x%<0 x%=0
1540 IF y%<0 y%=0
1550 ?X%=x%:?Y%=y%
1560 C%=C% AND &DF
1570 IF C%=73 PROCinter
1580 IF C%=67 PROCcopy
1590 IF C%=83 PROCsame
1600 IF C%=76 PROClimb
1610 UNTIL C%=70
1620 UNTIL eternity
1630 :
1640 DEF PROCset var
1650 B%=LOMEM+300:eternity=0:*FX 4,1
1660 FOR Q%=&71 TO &82:READ W%:?Q%=W%:N
EXT Q%
1670 FOR Q%=B% TO B%+23:READ W%:?Q%=W%/
4:NEXT Q%
1680 *FX 12,20
1690 E%=B%+24:N%=0:D=0:!"84=B%
1700 A$="XXXXXXXXXX":A$="":*OPT 1,1
1710 ENDPROC
1720 :
1730 DEF PROCinter:CLS
1740 REPEAT
1750 INPUT "Enter the first frame "F%
1760 INPUT"Enter the last frame "L%
1770 UNTIL F%<L% AND F%>=0 OR L%>N%
1780 I%=L%-F%
1790 F%=B%+F%*24:L%=B%+L%*24
1800 FOR Q%=0 TO 23
1810 D=(L%?Q%-F%?Q%)/I%:C%=0
1820 FOR W%=F%+24 TO L%-24 STEP 24
1830 C%=C%+1
1840 W%?Q%=F%?Q%+(C%*D)
1850 NEXT W%
1860 NEXT Q%
1870 ENDPROC
1880 :
1890 DEF PROCsave:CLS
1900 REPEAT
1910 INPUT "Enter file name";A$
1920 UNTIL LEN(A$)>1 AND LEN(A$)<8
1930 X%=OPENOUT(A$)
1940 PRINT #X%,N%
1950 FOR Q%=B% TO E%+24
1960 BPUT #X%,?Q%
1970 NEXT Q%

```

Continued ►




```

1980 CLOSE #X%
1990 ENDPROC
2000 :
2010 DEF PROCload:CLS
2020 REPEAT
2030 INPUT "" "Enter file name":A$
2040 UNTIL LEN(A$)>1 AND LEN(A$)<8
2050 X%=OPENIN(A$)
2060 INPUT #X%,N%:E%=B%+N%*24
2070 FOR Q%=B% TO E%+24
2080 ?Q%=BGET #X%
2090 NEXT Q%
2100 CLOSE #X%
2110 ENDPROC
2120 :
2130 DEF PROCcopy:CLS
2140 REPEAT
2150 PRINT "" "Source sequence : "
2160 INPUT "First frame: ",F%
2170 INPUT "Last frame : ",L%
2180 D%=L%-F%
2190 UNTIL F%>=0 OR F%<L%
2200 INPUT "" "Enter first frame"" "of object sequence",J%
2210 K%=J%+D%:IF J%<L% GOTO 2160
2220 IF B%+K%*24>(HIMEM-24) PRINT "NO ROOM!":GOTO 2030
2230 IF N%<K% N%=K%:E%=B%+K%*24
2240 J%=B%+J%*24:C%=24:F%=B%+F%*24
2250 INPUT "" "Reverse? (Y/N)":A$
2260 IF FNcaps(A$)=89 C%=-24 : F%=B%+L%*24
2270 FOR Q%=0 TO D%
2280 FOR W%=0 TO 23
2290 J%?W%=F%?W%
2300 NEXT W%
2310 F%=F%+C%:J%=J%+24
2320 NEXT Q%
2330 ENDPROC
2340 :
2350 DEF PROCtop
2360 FOR W%=E% TO P% STEP 24
2370 FOR Q%=0 TO 23
2380 W%?Q%=E%?(Q%-24)
2390 NEXT Q%
2400 NEXT W%
2410 E%=P%:N%=M%
2420 ENDPROC
2430 :
2440 DEF PROCsame:CLS
2450 REPEAT
2460 INPUT "" "Enter source frame":F%
2470 UNTIL F%>=0 AND F%<N%
2480 F%=B%+F%*24
2490 FOR Q%=0 TO 23
2500 F%?Q%=F%?Q%
2510 NEXT Q%
2520 ENDPROC
2530 :
2540 DEF PROClimb
2550 REPEAT
2560 INPUT "" "Enter new limb to be moved":S%
2570 UNTIL S%>=0 AND S%<12
2580 ENDPROC
2590 :
2600 DEF FNcaps(A$)=ASC(A$) AND &DF
2610 :
2620 REM Display order
2630 DATA 100,0,2,4,6,8,10,8,12,14
2640 DATA 100,6,16,18,100,4,20,22
2650 :
2660 REM Limb co-ords
2670 DATA 450,000,450,150,500,200
2680 DATA 500,400,450,500,550,500
2690 DATA 600,350,500,250,400,350
2700 DATA 500,250,550,150,550,000
2710 :
2720 REM ERROR HANDLER
2730 IF ERR=17 AND G%<30 PROCmenu
2740 IF ERR=17 CLS : END
2750 REPORT:PRINT ERL

```



See 'Capital Routine', page 77

Listing 1. The source code for the routine to turn capital letters on and off

```

10 REM Capitals
20 REM by Pete Gaunt
30 REM for BBC and Electron
40 REM (c) Acorn User May 1985
50 :
60 store=&74:on=&75
70 bufvec=&22A
80 oldbufvec=&230
90 uservec=&200
100 osbyte=&FFF4
110 code=&A00
120 FDR opt=0 TO 2 STEP2
130 P%=code
140 IDPT opt
150 .init
160 LDA #command MOD &100
170 STA uservec
180 LDA #command DIV &100
190 STA uservec+1
200 LDA #0
210 STA on
220 RTS
230 .command
240 BNE end_com
250 CPX#1
260 BNE com2
270 JSR caps_on
280 JMP end_com
290 .com2
300 CPX#0
310 BNE end_com
320 JSR caps_off
330 .end_com
340 RTS
350 .caps_on
360 LDA on
370 BNE end_on
380 LDA bufvec
390 STA oldbufvec
400 LDA bufvec+1
410 STA oldbufvec+1
420 LDA #check MOD &100
430 STA bufvec
440 LDA #check DIV &100
450 STA bufvec+1
460 LDA #1
470 STA on
480 .end_on
490 RTS
500 .caps_off
510 LDA on
520 BEQ end_off
530 LDA oldbufvec
540 STA bufvec
550 LDA oldbufvec+1
560 STA bufvec+1
570 LDA #0
580 STA on
590 .end_off
600 RTS
610 .check
620 STA store
630 PHP:PHA:TXA:PHA:TYA:PHA
640 CPX#0
650 BNE no_change
660 LDA store
670 CMP#ASC"a"
680 BCC no_change
690 CMP#ASC"z"+1
700 BCS no_change

```

```

710 EOR#32
720 STA store
730 PLA:TAY:PLA:TAX:PLA:PLP
740 LDAstore
750 .exit
760 JMP(oldbufvec)
770 .no_change
780 PLA:TAY:PLA:TAX:PLA:PLP
790 JMPexit
800 J
810 NEXT

```

PROGRAM POINTS 1

Listing 1 provides the source code for the routine to turn capital letters 'on' and 'off', avoiding the CAPS LOCK problem. The machine code assembles into the cassette /RS423 input buffer at &A00. Subsequent use of tape or serial port will destroy the code. It can of course be loaded into another area, such as the user definable character buffer at &C00. The assembled code can be saved using

*SAVE CAPS A00 + 85 (or &C00 + 85 if relocated)

Capitals can be turned on and off in the following ways:

Capitals on: *CODE 1 or *FX136,1
Capitals off: *CODE 0 or *FX136,0

If you append this listing onto your main program rather than *LOADing in the machine code then do remember to initialise it by adding a line,

CALL init

before using *CODE or *FX136

If you wish to adapt the program, the following lines will be of interest to you:

Line 160: set user vector to point to "command" routine

Line 230: direct command depending on setting of X

Line 240: A = 0 if command is *CODE. If not then no action

Line 270: If X = 1 turn caps on

Line 320: If X = 0 turn caps off

Line 360: Check if routine already in operation

Line 380: Save default vector

Line 420: Set vector to point to check

Line 470: Set 'on-flag' to 1

Line 510: check if already off

Line 530: restore default vector

Line 580: set 'on-flag' to 1

Line 620: character to be inserted is in A - store temporarily

Line 640: check that character is destined for keyboard buffer (X=0)

Line 710: If lower case convert to upper case

Line 740: load A with new character

Listing 2. Converts lower case letters in a Basic string to upper case

```

10 REM Upper Case
20 REM by Pete Gaunt
30 REM for BBC and Electron
40 REM (c) Acorn User May 1985
50 :
60 MODE3
70 PROCupper_case
80 :
90 REM Test routine
100 REPEAT
110 INPUTLINE""Enter test string""test$
120 CALL upper_case,test$
130 PRINT test$
140 UNTIL FALSE
150 :
160 DEFPROCupper_case
170 upper_case=&A90
180 block=&70:string=&72:par=&600
190 FOR opt=0 TO 2 STEP2
200 PZ=upper_case
210 LOPT opt
220 LDA par+1
230 STA block
240 LDA par+2
250 STA block+1
260 LDY #0
270 LDA (block),Y
280 STA string
290 INY
300 LDA (block),Y
310 STA string+1
320 INY
330 INY
340 LDA (block),Y
350 TAY
360 BEQ exit
370 .loop
380 DEY
390 LDA (string),Y
400 CMP #ASC"a"
410 BCC next
420 CMP #ASC"z"+1
430 BCS next
440 EOR #32
450 STA (string),Y
460 .next
470 CPY #0
480 BNE loop
490 .exit
500 RTS
510 J
520 NEXT
530 ENDPROC

```

PROGRAM POINTS 2

Listing 2 is the routine to convert lower case letters in a Basic string into upper case letters. To use it just enter:

CALL upper_case, X\$

where X\$ (or any other you care to specify) contains the string to be converted.

The listing provides the source code which assembles its machine code from &A90 – above the listing 1 code. Again it's possible to relocate this to suit if you need to.

To save the machine code use:

*SAVE UPPER A90 + 30

The following program details may be of use to you:

Line 220: get address of the string information block from the parameter block and store in zero page at "block"

Line 270: get address of string from the string information block and store in zero page at "string"

Line 340: get length of string from information block and transfer to Y

Line 360: if null string then exit

Line 370: work down the string from the end

Line 390: load character into A

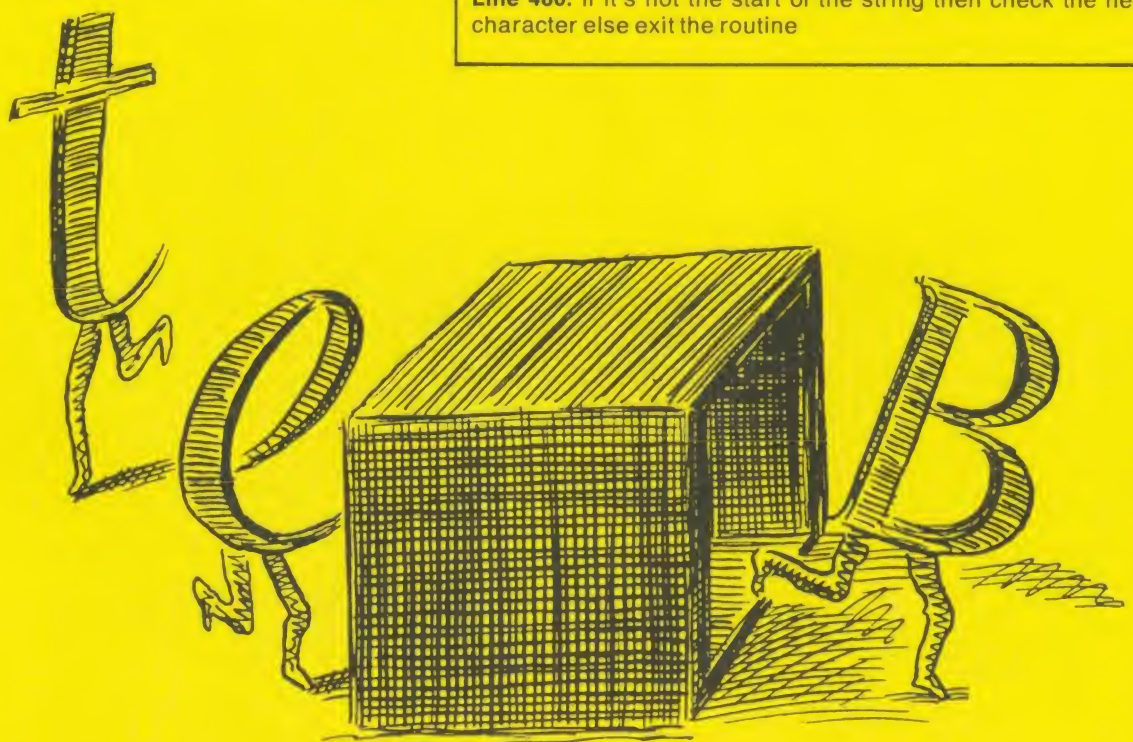
Line 410: if less than "a" then it's not lower case

Line 430: if greater than "z" then it's not lower case

Line 440: if lower case then convert to upper case

Line 450: store it in place of original character

Line 480: if it's not the start of the string then check the next character else exit the routine



Listing 3. A demonstration of the routine

```

10 REM Demonstration Program
20 REM by Pete Gaunt
30 REM for BBC and Electron
40 REM (c) Acorn User May 1985
50 :
60 MODE3
70 PROCupper_case
80 REM If loading code miss out
90 REM above line and remove the
100 REM folloing two REM's to leave
110 REM the commands to be executed
120 REM *LOAD UPPER
130 REM upper_case=&A90
140 :
150 items%=10
160 DIM word$(items%)
170 FOR N%=1 TO items%
180 PRINT:"Word no. ":N%". ":
190 INPUTLINEword$(N%)
200 NEXT
210 :
220 FOR J%=0 TO items%-1
230 K%=J%+1
240 FOR I%=K% TO items%
250 L%=items%+K%-I%
260 w1#=word$(L%):w2#=word$(J%)
270 CALL upper_case,w1#:CALL upper_cas
e,w2#
280 IF w1#<w2# t#=word$(L%):word$(L%)
=word$(J%):word$(J%)=t#
290 NEXT
300 NEXT
310 :
320 PRINT "Sorted...."
330 FOR N%=1 TO items%
340 PRINTword$(N%)
350 NEXT
360 END
370 :
380 DEFPROCupper_case
390 DIM upper_case 50
400 block=&70:string=&72:par=&600
410 FOR opt=0 TO 2 STEP2
420 P%=upper_case
430 COPT opt
440 LDA par+1
450 STA block
460 LDA par+2
470 STA block+1
480 LDY #0
490 LDA (block),Y
500 STA string
510 INY
520 LDA (block),Y
530 STA string+1
540 INY
550 INY
560 LDA (block),Y
570 TAY
580 BEQ exit
590 .loop
600 DEY
610 LDA (string),Y
620 CMP #ASC"a"
630 BCC next
640 CMP #ASC"z"+1
650 BCS next
660 EOR #32
670 STA (string),Y
680 .next
690 CPY #0
700 BNE loop
710 .exit
720 RTS
730 J
740 NEXT
750 ENDPROC

```

PROGRAM POINTS 3

Listing 3 contains the PROCupper_case coding once again. If you have already entered and saved the machine code generated by listing 2 you can leave out the lines from 370 onwards. However you will need to have the machine code on the same disc or present directly after listing 3 on the cassette tape. If you use the machine code method you should also delete line 70 and enter lines 120 and 130 as commands and not REMs thus:

```

120 *LOAD UPPER
130 upper_case= &A90

```



Listing 1. Tristram Mabbs' program allows you to have more than one mode on screen at a time

```

10 REM Modes by interrupts
20 REM By Tristram Mabbs
30 REM For BBC Micro
40 REM (C) Acorn User May 1985
50 :
60 Mode=0
70 DIM DLIs 15,DefCols 21
80 Line_Val=&260
90 :
100 REM Set up a demonstration
110 FOR A=0 TO 8+3*ABS(Mode<4) STEP 3
120 A!DLIs=6*Line_Val:?(A+DLIs+2)=(A/3
)+4*ABS(Mode>3)
130 NEXT A
140 A!DLIs=TRUE
150 RESTORE 330
160 FOR A=0 TO 21
170 READ DefCols?A
180 NEXT A
190 MODE Mode
200 :
210 REM This PROC does the work
220 PROCsetdlis(DLIs,DefCols)
230 PROCmode(0)
240 PROCtextdemo
250 PROCmode(1)
260 PROCtextdemo2
270 PROCmode(2)
280 PROCCubesdemo
290 PROCmode(3)
300 PROCtextdemo3
310 END
320 REM Data default colours
330 DATA 0,7,0,1,3,7,0,1,2,3,4,5,6,7,8,
9,10,11,12,13,14,15
340 :
350 DEF PROCmode(mode)
360 REM Fool MDS-"This is a mode!"
370 A%=174:X%=0:Y%=&FF
380 vduvars=(USR(&FFF4)AND&FFFF00)/256
390 RESTORE (1000+mode*10)
400 READ value
410 vduvars?&0A=value
420 READ value
430 vduvars?&4F=value
440 READ value
450 vduvars?&52=value
460 READ value
470 vduvars?&53=value
480 READ value
490 vduvars?&55=value
500 READ value
510 vduvars?&60=value
520 READ value
530 vduvars?&61=value
540 READ value
550 vduvars?&62=value
560 READ value
570 vduvars?&63=value
580 ENDPROC
585 :
590 DEF PROCtextdemo
600 FOR A=1 TO 7
610 PRINT"This is MODE 0"
620 NEXT A
630 PRINT
640 ENDPROC
645 :
650 DEF PROCtextdemo2
660 FOR A=1 TO 6
670 COLOUR A
680 PRINT"This is MODE 1"
690 NEXT A
700 ENDPROC
705 :
710 DEF PROCCubesdemo
720 FOR A=1 TO 10
730 X=RND(128):Y=RND(128)+320
740 GCOL 0,(A*3)
750 PLOT 69,X,Y
760 PLOT 69,X+40,Y
770 PLOT 85,X,Y+40
780 PLOT 69,X+40,Y
790 PLOT 85,X+40,Y+40
800 GCOL 0,(A*3)+1
810 PLOT 69,X,Y+40
820 PLOT 85,X+60,Y+60
830 PLOT 85,X+20,Y+60
840 GCOL 0,(A*3)+2
850 PLOT 69,X+40,Y+40
860 PLOT 69,X+60,Y+60
870 PLOT 85,X+40,Y
880 PLOT 85,X+60,Y+20
890 NEXT A
900 COLOUR 7
910 PRINT""Mode 2...."
920 ENDPROC
925 :
930 DEF PROCtextdemo3
940 VDU31,0,25
950 COLOUR 1
960 FOR A=1 TO 6
970 PRINT"This is MODE 3"
980 NEXT A
990 ENDPROC
995 :
1000 DATA 79,8,&80,2,0,1,7,&80,1
1010 DATA 39,&10,&80,2,1,3,&88,&11
1020 DATA 19,&20,&80,2,2,&F,1,&AA,&55
1030 DATA 79,8,&80,2,3,1,0,128,1
1040 DATA 39,8,&40,1,4,1,7,128,1
1050 DATA 19,&10,&40,1,5,3,3,&88,&11
1060 DATA 39,8,&40,1,6,1,0,128,1
1070 :
10000 DEF PROCsetdlis(Data1,Data2)
10010 *FX9
10020 *FX10
10030 DIM Code FNassemble(0,&C000)
10040 A=FNassemble(0,Code)
10050 A=FNassemble(2,Code)
10060 A=?Data1+&CB: ?Data1=A
10070 Data1?1=((Data1?1)+((A AND&F00)/&1
00)+6)
10080 CALL Vec_Setup
10090 ENDPROC
10095 :
10100 DEF FNassemble(Pass,Adr)
10110 P%=Adr:[OPT Pass
10120 \ Change IRQ1 vector
10130 .Vec_Setup SEI
10140 LDA&204:STA OldIrq:LDA&205:STA Old
Irq+1
10150 LDA#NewIrq AND&FF:STA&204:LDA#NewI
rq/256:STA&205
10160 CLI:RTS
10170 .OldIrq BRK:BRK
10180 \ New interrupt routine
10190 .NewIrq LDA&FC:PHA:TXA:PHA:TYA:PHA
10200 LDA&FE4D:AND&FE4E:AND#&20
10210 BNE DLI
10220 LDA&FE4D:AND&FE4E:AND#2
10230 BNE FSI

```

Continued ►

◀ Continued

```

10240 .Irq_Exit PLA:TAY:PLA:TAX:PLA:STA&
FC:JMP(OldIrq)
10250 \ Interrupts identified
10260 .FSI LDA&FE4E:AND#&20:BEQ Irq_Exit
10270 LDA#0:STA ModeCount
10280 \ DLI routine
10290 .DLI STA&FE4D
10300 LDX ModeCount
10310 LDA Data1+2,X:BMI Timer:TAY
10320 LDA ULAdat,Y:STA&FE20
10330 LDA Cols,Y
10340 CMP#2:BNE CN2:\two colour modes
10350 LDY#0:.C2_1
10360 LDA Data2,Y:EOR#7:ORA Col2base,Y
10370 LDX#7:.C2_2
10380 STA&FE21:CLC:ADC#&10
10390 DEX:BPL C2_2
10400 INY:CPY#2:BNE C2_1
10410 BEQ Timer
10420 .CN2 CMP#4:BNE CN4:\ 4 colour mode
S
10430 LDY#0:.C4_1
10440 LDA Data2+2,Y:EOR#7:ORA Col4base,Y
10450 STA&FE21:CLC:ADC#&10
10460 STA&FE21:CLC:ADC#&30
10470 STA&FE21:CLC:ADC#&10
10480 STA&FE21
10490 INY:CPY#4:BNE C4_1
10500 BEQ Timer
10510 .CN4 \sixteen colour mode
10520 LDY#0:.C16_1
10530 LDA Data2+6,Y:EOR#7:STA Col16base
10540 TYA:ASLA:ASLA:ASLA:ASLA
10550 ORA Col16base
10560 STA&FE21
10570 INY:CPY#16:BNE C16_1
10580 .Timer
10590 LDA&FE4B:AND#&DF:STA&FE4B
10600 LDX ModeCount
10610 LDA Data1,X:STA&FE4B:INX:LDA Data1
,X:STA&FE49
10620 INX:INX:STX ModeCount
10630 LDA#&A0:STA&FE4D:STA&FE4E
10640 JMP Irq_Exit
10650 \ Assorted data
10660 .ModeCount BRK
10670 .Col2base :J:?P%=0:P%?1=&B0:P%=P%+
2:[OPT Pass
10680 .Col4base :J:!P%=&A0802000:P%=P%+4
:[OPT Pass
10690 .Col16base BRK
10700 .ULAdat :J:!P%=&9CF4DB9C:P%!4=&88C
488:P%=P%+7:[OPT Pass
10710 .Cols :J:!P%=&2100402:P%!4=&20402:
P%=P%+7:[OPT Pass
10720 J:=P%-Adr
10725 :
10730 DEF PROCDlisoFF
10740 ?&FE4E=&20:ENDPROC
10745 :
10750 DEF PROCDlison
10760 ?&FE4E=&A0:ENDPROC

```

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IF KEYING in all these listings gets you down and your fingers in a tangle why not send off for our monthly listings cassette?

It contains all the major programs in this issue and costs £3.75 including postage and packing. You'll find the details about the cassette and the order form on page 96.

Better still, be the envy of your friends and buy a bar-code reader (see our offer on page 113). All the listings in these yellow pages are reproduced in bar code format – send a cheque or postal order for £1.60 plus an A4 sized stamped addressed envelope to Bar Code Listings (May), Acorn User, 68 Long Acre, London WC2E 9JH.

Listing 1. C M Ferrington's cursor move routine to use with Colfill

```

1 REM Cursor Procedures
2 REM by C M Ferrington
3 REM Beeb Forum
4 REM (c) Acorn User May 1985
5 :
6 DIM B% 15,K%(15)
41 VDU23,240,32,32,248,32,32,0,0,0
45 VDU23,241,248,248,248,248,248,0,0,0
5000 DEFPROC_Cursor(X%,Y%)
5002 :
5004 REM ADJUST X% AND Y% SO THAT CENTR
E OF CURSOR IS AT TRUE GRAPHICS
5006 REM COORDINATES.
5008 :
5020 LOCAL I%,X1%,X2%
5030 X%=X%-8:Y%=Y%+8
5032 :
5034 REM FIND ADDRESS OF BLOCK OF SCREE
N MEMORY
5036 :
5040 M%=&3000+(31-(Y% DIV 32))*640+(X% D
IV 16)*8+(255-(Y% DIV 4))MOD 8
5042 :
5044 REM SAVE BLOCK OF MEMORY INTO B%
5046 REM SAVE ADDRESSES INTO K%()
5048 :
5050 X1%=M% DIV 8
5060 FORI%=0TO4:X2%=M%+I%
5070 IF (X2% DIV 8)>X1% X2%=X2%+632
5080 B%?I%=X2%?0:B%?(I%+8)=X2%?8
5090 K%(I%)=X2%:K%(I%+8)=X2%+8
5100 NEXT
5102 :
5104 REM SET BLOCK OF SCREEN TO BACKGRD
UND AND PRINT +
5106 :
5110 VDU5,18,0,0,25,4,X%;Y%;241,18,0,2,8
,240,4
5120 ENDPROC
5130 DEFPROC_Wipe
5132 :
5134 REM USE ADDRESSES IN K%() AND VALU
ES IN B% TO RESTORE SCREEN MEMORY
5136 :
5140 ?(K%(0))=B%?0:?(K%(8))=B%?8
5150 ?(K%(1))=B%?1:?(K%(9))=B%?9
5160 ?(K%(2))=B%?2:?(K%(10))=B%?10
5170 ?(K%(3))=B%?3:?(K%(11))=B%?11
5180 ?(K%(4))=B%?4:?(K%(12))=B%?12
5190 ENDPROC

```

Listing 2. Demonstration of the cursor move program

```

1 REM Cursor Demonstration
2 REM by C M Ferrington
3 REM Beeb Forum
4 REM (c) Acorn User May 1985
5 :
6 DIM B% 15,K%(15)
10 *LOAD "COLFILL" 1200
12 Cfill=&1200
20 *TV0,1
40 MODE1:*FX4,1
41 VDU23,240,32,32,248,32,32,0,0,0
42 VDU24,0;0;1279;950;
43 VDU28,0,0,39,1
44 VDU23;8202;0;0;0;
45 VDU23,241,248,248,248,248,248,0,0,0
50 *LOAD "SHADES" 3000
60 X%=640:Y%=512
200 PRINT"CURSOR DEMO - USE CURSOR KE
YS TO MOVE"
202 PRINT"SHIFT=FAST - CTRL=FASTER
- Q=QUIT";
210 PROC_Cursor(X%,Y%)
212 REPEAT:REPEAT
214 L=INKEY(-26)*4:R=INKEY(-122)*4:U=IN
KEY(-58)*4:D=INKEY(-42)*4:Q=INKEY(-17)
215 FAST=INKEY(-1):FASTER=INKEY(-2)
216 UNTIL L+R+U+D+Q<>0
220 IF L+R+U+D<>0 PROC_Wipe
222 F1=1:IF FAST F1=4
224 F2=1:IF FASTER F2=8
230 X%=X%+L*F1*F2-R*F1*F2:Y%=Y%+D*F1*F2
-U*F1*F2
232 IF X%<8 X%=8
234 IF X%>1263 X%=1263
236 IF Y%<8 Y%=8
238 IF Y%>1000 Y%=1000
240 PROC_Wait(5)
242 PROC_Cursor(X%,Y%)
250 UNTIL Q=-1
252 *FX21,0
260 MODE3:*FX4,0
270 END
5000 DEFPROC_Cursor(X%,Y%)
5020 LOCAL I%
5030 X%=X%-8:Y%=Y%+8
5040 M%=&3000+(31-(Y% DIV 32))*640+(X% D
IV 16)*8+(255-(Y% DIV 4))MOD 8
5050 X1%=M% DIV 8
5060 FORI%=0TO4:X2%=M%+I%
5070 IF (X2% DIV 8)>X1% X2%=X2%+632
5080 B%?I%=X2%?0:B%?(I%+8)=X2%?8
5090 K%(I%)=X2%:K%(I%+8)=X2%+8
5100 NEXT
5110 VDU5,18,0,0,25,4,X%;Y%;241,18,0,2,8
,240,4
5120 ENDPROC
5130 DEFPROC_Wipe
5140 ?(K%(0))=B%?0:?(K%(8))=B%?8
5150 ?(K%(1))=B%?1:?(K%(9))=B%?9
5160 ?(K%(2))=B%?2:?(K%(10))=B%?10
5170 ?(K%(3))=B%?3:?(K%(11))=B%?11
5180 ?(K%(4))=B%?4:?(K%(12))=B%?12
5190 ENDPROC
7000 DEFPROC_Wait(t)
7002 TIME=0:REPEAT UNTIL TIME=t
7004 ENDPROC

```


Listing 4. This program from Neil MacFadyen allows you to time machine code

```

10 REM Machine Code Timer
20 REM by Neil MacFadyen
30 REM For BBC micro
40 REM (c) Acorn User March 1985
50 *K.1 PA.=&E00:MOLD:M
60 *K.0 PA.=&6600:MPROCevaluate!MPA.=&E00:M
70 PROCassemble:PROCprint
80 PRINT"Press f1 to return to main program":END
90 DEFPROCassemble:VDU15
100 divtime%=&80:modtime%=&81:vectsto%=&83
110 timer1%=&FE64:IRQ2V=&206
120 ifr%=&FE6D:ier%=&FE6E:acr%=&FE6B
130 FOR I%=0 TO 3 STEP 3
140 P%=&A00
150 [OPTI%
160 .staco%
170 PHP:PHA:TXA:PHA:TYA:PHA
180 LDA#0:STA divtime%
190 LDA #&40:ORA acr%:STA acr%
200 LDA #&C0:ORA ifr%:STA ifr%
210 LDA #&C0:ORA ier%:STA ier%
220 LDA IRQ2V:STA vectsto%
230 LDA IRQ2V+1:STA vectsto%+1
240 SEI:LDA#irco% MOD256:STA IRQ2V
250 LDA#irco% DIV256:STA IRQ2V+1:CLI
260 LDA #&FF:STA timer1%:STA timer1%+1
270 JMP end%
280 .irco%
290 LDA&FC:PHA:TXA:PHA:TYA:PHA
300 LDA ifr%:AND#&C0:CMP#&C0:BNEex
310 STAifr%:LDX divtime%:INX:STX divtime%
320 .ex
330 PLA:TAY:PLA:TAX:PLA:STA&FC
340 JMP(vectsto%)
350 .stopco%
360 PHP:PHA:TXA:PHA:TYA:PHA
370 SEI:LDA timer1%:LDX timer1%+1:CLI
380 CMP#3:BCS no_adj
390 INX
400 .no_adj
410 LDY#64:STY ier%
420 STA modtime%:STX modtime%+1
430 LDA vectsto%:LDX vectsto%+1
440 SEI:STA IRQ2V:STX IRQ2V+1:CLI
450 .end%
460 PLA:TAY:PLA:TAX:PLA:PLP:RTS
470 JNEXT
480 ENDPROC
490 DEFPROCprint
500 PRINT"timeron = &";~staco%
510 PRINT"timeroff= &";~stopco%
520 ENDPROC
530 DEFPROCevaluate
540 fact1%=29:fact2%=100
550 modtime%=&81:divtime%=&80
560 divno%=(10000-fact2%)*?divtime%
570 modno%=&10000-?(modtime%+1)*&100-?modtime%-fact1%
580 PRINTTAB(15)"No. of cycles = ";(modno%+divno%)*2
590 PRINTTAB(15)"=====
==":ENDPROC

```

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Listing 3. Alex Whitfield's enhancements to January's automatic disc file update

```

10*KEY20=PA.+87:??Q=?Q+1:Q%=&B00+?&B02:Q%??7=?Q:M:Q%=&B00+?&B03:Q%?13=?Q:MSA."I.PROGst5":M
20*KEY3LD."I.PROGst2":M

```

Listing 5. Produce 256 colours on screen in mode 2 with D Litvin's routine

```

10 REM 256 Colours
20 REM Beeb Forum
30 REM (c) Acorn User May 1985
40 :
50 B=0
60 REPEAT
70 MODE 2
80 FOR I=1 TO 1024 STEP 113
90 MOVE 0,I:DRAW 1280,I
100 NEXT
110 FOR I=1 TO 1280 STEP 142
120 MOVE I,0:DRAW I,1024:NEXT
130 FOR I=0 TO 1024 STEP 113
140 FOR Z=0 TO 1280 STEP 142
150 FOR P=(Z+8) TO (Z+134) STEP 4
160 ?&359=B
170 MOVE P,(I+8):DRAW P,(I+105)
180 NEXT P
190 B=B+1
200 NEXT
210 NEXT
220 A=GET
230 CLS
240 B=B+64
250 UNTIL 0

```

Listing 6. Miranda Williams' Wordwise pager

```

10 REM Wordwise Pager
20 REM For BBC Micro with Wordwise
30 REM by Miranda Williams
40 REM (c) Acorn User March 1985
50 MODE 7
60 oscli=&FFF7
70 DIM command 30
80 CLOSE #0
90 INPUT "Type in the filename. "F$
100 ch=OPENUP F$
110 IF ch=0 THEN PRINT CHR$(133);"File ";F$ does not exist!":CLOSE #ch:STOP
120 lines=0:nopages=0
130 CLS
140 REPEAT
150 nopages=nopages+1
160 CLS
170 REPEAT
180 Z=BGET#ch
190 IF Z=13 THEN lines=lines+1
200 IF Z=13 AND lines<>25 THEN VDU10,13
ELSE IF Z>31 VDU Z
210 UNTIL EOF#ch OR lines=25
220 lines=0
230 PROCOSCLI ("SAVE PAGE"+STR$nopages+" 7C00 +400")
240 UNTIL EOF#ch
250 CLS
260 CLOSE #0
270 PRINT"CHR$131"JOB DONE"" ";
280 END
290 :
300 DEF PROCOSCLI($command)
310 X%=$command MOD 256
320 Y%=$command DIV 256
330 CALL oscli
340 ENDPROC

```


See 'High Voltage', page 119

Listing 1. Paul Beverley's program to set up a voltmeter using the ADC

```

10REM Voltmeter program
15REM by Paul Beverley
20REM For BBC and Electron/Plus-1
25REM (c) Acorn User - May 1985
30:
40scalefactor=1570.8:REM if you already
  know it.
50MODE 7
60PROCinitialise
70REPEAT
  80V=FNreadADC/scalefactor
  90PRINT TAB(14,10) CHR$(141);V;" "
  100PRINT TAB(14,11) CHR$(141);V;" "
  110IF M%=77 PRINT TAB(W%,22);V;" ":W%=W%
+10
  120W%=W% MOD 40
  130M%=INKEY(0)
  140IF M%>127 PROCchange
  150UNTIL M%=13
  160MODE7
  170@%=10
  180*FX225,1
  190END
200:
210DEF FNreadADC
220total%=0
230FOR N%=1 TO samples%
240REPEAT UNTIL ADVALODIV256=1
250total%=total%+ADVAL1
260NEXT
270IF ADVAL1>65500 SOUND 1,-15,200,20
280=total%/samples%
290:
300DEF PROCinitialise
310*FX16,1
320*FX225,128
330PRINT"Put probes across known pd"
340PRINT"and enter the value of the volt
  age."
350PRINT"or press return to continue"
360INPUT; Vref
370samples%=64
380IF Vref>0 scalefactor=FNreadADC/Vref
390samples%=16
400CLS
410VDU23;B202;0;0;0;
420PRINT TAB(15,8)"VOLTS"
430PRINT TAB(1,20)"MEM 1","MEM 2","MEM 3
  ","MEM 4"
440PRINT TAB(5,16)"PRESS 'M' TO STORE RE
  ADING"
450@%=&2020A
460W%=1
470ENDPROC
480:
490DEF PROCchange
500IF M%=128 samples%=samples%*2
510IF M%=129 samples%=samples%/2
520IF samples%=2 samples%=4
530ENDPROC

```

```

10 REM ZYLEK DLP EYJK DATXE EZI JMTAK
20 REM LTE YL DLR TMPIM
30 REM KTHIEZYLB LTE BXDMDLEIIP ZIMI
40 REM DFTML STL TN FTXMKI
50 REM KRHJZTLYF ZDMHTLR
60 REM PDLYKZ JMYLFI SYEZ D HYFMT HDRAI
70 REM ZIV STMPK BYQI PIFYHDO DLKSIM
80 REM EZIR DMI LTE DOO MIP
90 REM KEMYJ TNN EZI DHJIMKDLP DLP EMIDE
  SZDE RTX DMI OINE SYEZ DK D PIFYHDO
100 REM EZYK JXUUI KIEEIM PTIK LTE OYGI
  YLGIR AIYLB KT LIBDEYQI D NTMFI

```

```

10 REM HOW TO GET THE ANSWER
20 TOTAL=0
30 LET TOTAL-TOTAL;ANNE
40 LET TOTAL-TOTAL;GOALS
50 LET TOTAL-TOTAL;PRIMEANSWER=XSUMANSWER
60 LET TOTAL-TOTAL=DANISHPROBLEM
70 LET TOTAL-TOTAL:(INKEY?MORSE)
80 LET TOTAL-TOTAL=HEXWORDSUM
90 LET TOTAL-TOTAL;FORMAT=UNSCRAMBLEDRATE
100 LET TOTAL-TOTAL;MUSICANSWER
110 LET TOTAL-TOTAL=YEARCHARLESBABBAGEDIED
120 PRINTTOTAL;REM BEST PRINT ON A POSTCARD
130 REM CLAIM PRIZE!

```


TOP OF THE LIST

GRAHAM JONES from Blackburn was spurred into supplying this month's Top of the List after seeing a program in Beeb Forum, and it earns him £25. Graham's program is a sound compiler – a program that converts a series of sound commands into a machine code usable form. The sound sequences are provided by a Basic program, caught as they are produced by the micro and stored within memory. You certainly do not need to be a machine code programmer to use the program, in fact if you have never dabbled at machine code before this would be a very good time to start. Just enter the listing as you see it and run it!

For the more technically minded reader the program works by intercepting the OSWORD vector and passing all OSWORD based calls into the machine code routine called 'neword'. Sound is produced using an OSWORD call with the accumulator containing the number 7. When an OSWORD call is issued by the MOS it is directed to the machine code here which then tests to see if the accumulator does contain 7. If it does then the command is a SOUND command – if it is not, then the call is handed back to the micro's normal OSWORD handling routine. If the call is a sound-producing one, then the eight byte parameter block used by the OSWORD call is stored in the eight bytes of memory pointed to by 'block%'. This storage of sound data continues until either the storage memory is filled or the sound generating program ends.

Using the sound compiler is extremely easy, as the listing shows. Lines 100 to 750 should be included in your own program. All you need do is to add the line:

PROCassemble

at the start of your program and the line:

CALL intercept

before any sound commands are issued. The sound command should be terminated by the line:

CALL restore.

When the sound program is RUN the compiler will store the commands at &3000. This location can be changed

to suit your needs by adjusting the value assigned to 'block%' in line 130. This is the memory used by the high resolution screen modes, so changing mode after compiling your sound is not advised!

To play back the routine from Basic, the integer variables X% and Y% point to the start address of the sound data, as specified by block%. This is best done using:

X% = block% MOD 256

Y% = block% DIV 256

The sound can then be played with the command:

CALL sound

Playing back the sound from within assembler is executed in a similar vein. The index registers should point to the start of the sound data, which is played with the command:

JSR sound

Once the sound has been compiled it can, of course, be saved as a block of memory. To do this you need to know its start and end address. The start address is found by knowing the values assigned to block% as defined in line 130. The end address is found by typing:

PRINT ~(!&82 AND &FFFF) + 2

If the start and end addresses were &3000 and &3200 respectively, the save command would be:

*SAVE SDATA 3000 3200

Using this method, libraries of sound data could be compiled. For the real machine code buffs, the sound compiler coding could be saved with the sound data itself, which is fully relocatable as it is just data. Obviously the routine will not compile delay loops. If they are required they can be inserted by using a 'blank note', with a duration from 0 to 255. For example the command:

SOUND 1,0,0,0

would produce a small pause between two sounds on channel 1.

TOP OF THE LIST

110

```

10 REM Sound Compiler
20 REM By Graham M Jones
30 REM For BBC & Electron
40 REM (c) Acorn User May 1985
50 :
60 PROCassemble
70 PROCdemo
80 END
90 :
100 DEF PROCassemble
110 :
120 DIM code% 160
130 block%=&3000
140 OSWORD=&FFF1
150 FOR pass%=0 TO 3 STEP 3
160 P%=code%
170 [OPT pass%
180 :
190 .intercept
200 LDA &20C:STA &80
210 LDA &20D:STA &81
220 LDA #(newword MOD 256):STA &20C
230 LDA #(newword DIV 256):STA &20D
240 LDA #(block% MOD 256):STA &82
250 LDA #(block% DIV 256):STA &83
260 RTS
270 :
280 .newword
290 CMP #7:BNE osword
300 PHA:TYA:PHA
310 STX &84:STY &85
320 LDY #0
330 .copypar
340 LDA (&84),Y
350 STA (&82),Y
360 INY
370 CPY #8
380 BNE copypar
390 LDA &82:CLC:ADC #8:STA &82
400 BNE exit
410 INC &83
420 LDA &83:CMP #&80:BEQ stop
430 .exit
440 PLA:TAY:PLA
450 .osword
460 JMP (&80)
470 :
480 .stop
490 PLA:TAY:PLA
500 :
510 .restore
520 PHA:TYA:PHA
530 LDA &80:STA &20C
540 LDA &81:STA &20D
550 LDY #1:LDA #&F0:STA (&82),Y
560 PLA:TAY:PLA
570 RTS
580 :
590 .sound
600 STX &70:STY &71
610 .makesound
620 LDA #7:LDX &70:LDY &71
630 JSR OSWORD
640 LDA &70:CLC:ADC #8:STA &70
650 BNE checkend
660 INC &71
670 .checkend
680 LDY #1:LDA (&70),Y:CMP #&F0
690 BEQ end
700 LDA &71:CMP #&80:BNE makesound
710 .end
720 RTS
730 :
740 I
750 NEXT pass%
760 :
770 ENDPROC
780 :
790 DEF PROCdemo
800 :
810 CALL intercept
820 FOR I%=0 TO 255 STEP 4
830 SOUND 0,-4,I%,1
840 SOUND 1,-15,I%,1
850 SOUND 2,-15,I%,1
860 SOUND 3,-15.255-I%,1
870 NEXT I%
880 CALL restore
890 :
900 X%=block% MOD 256
910 Y%=block% DIV 256
920 :
930 PRINT " Press any key ...."
940 *FX 15,1
950 G%=GET
960 :
970 CALL sound
980 :
990 ENDPROC

```


[illegible]

BAR CODE OFFER



113

KEEP UP WITH THE KIDS IN SCHOOL

BAR CODES will revolutionise the way we use computers in applications as well as the way we load data. Here is the chance to get experience of this important development by ordering the Addison Wesley/MEP Bar Code Teaching Pack (see our January issue, page 129) direct through *Acorn User*.

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Acorn User will be printing some listings in bar code format in each issue and making booklets of bar codes available by mail order.

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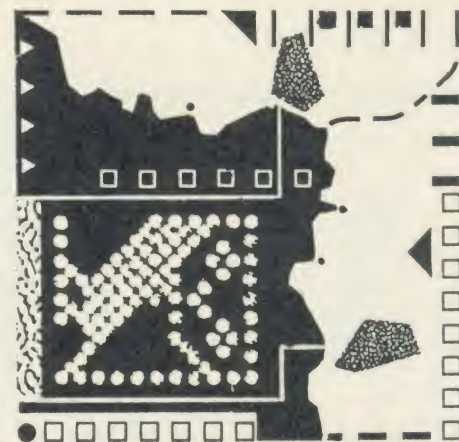
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Readers' tips, edited by Bruce Smith, this month concentrate on how to get the best from your colour graphics



114

£10 The vanishing cursor

PETER SANDFORD'S two excellent articles on dot and colour filling have caught the imagination of many of you, to judge by your letters and phone calls. C M Ferrington of South Queensferry has supplied a couple of cursor move routines for use with COLFILL (see *AU* January). Mr Ferrington writes: The normal way of plotting and erasing (ie, with GCOL 3) is fine if solid colours are involved, and a cursor so plotted will be visible even though its colour will change depending on the colour it overlays. With colour mixtures, however, the cursor sometimes becomes almost invisible.

It was with this in mind that I wrote the two routines PROC_Cursor and PROC_Wipe (listings 1 and 2). The procedures require the following in the main program:

- (1) a block of 16 bytes DIM B%(15)
- (2) an integer array of 16 elements DIM K%(15)
- (3) characters 240 and 241 to be redefined:

```
VDU23,240,32,32,248,32,32,0,0,0
VDU23,241,248,248,248,248,248,0,0,0
```

PROC_Cursor(X%,Y%) works by placing the screen memory associated with the point X%,Y% in B%(0-15), then replacing that part of the screen with a cursor *on its own background*. It also fills K% with the addresses of screen memory so replaced.

PROC_Wipe simply replaces the screen memory at X%,Y%, effectively removing the cursor which can then be replotted elsewhere by PROC_Cursor. It is important that the cursor is not 'plotted' outside the screen area, but I have left it up to the calling program to check that this will not happen.

Line 5110 is the cursor output statement:

```
VDU5 Write characters at graphics cursor
VDU18,0,0 Set colour for 'background' of cursor
```

```
VDU25,4,X%;Y%; Move graphics cursor to X%,Y%
VDU241 Output 'background'
VDU18,0,2 Set cursor colour
VDU8 Backspace
VDU240 Output cursor
VDU4 Restore text cursor
```

The adjustment of -8 and +8 to X% and Y% at line 5030 is needed to ensure that the centre of the cursor is at the graphics position.



Dotfill's 24 patterns - this routine and Colfill have fired your imaginations

£5 Save our updates

ALEC WHITFIELD from Maidenhead has suggested a couple of enhancements to the automatic disc file update presented by Dr Borcherd in the January Forum. Alec writes:

In listing 3 the first (line 10) is to rearrange the order a little. By putting the SAVE command at the end, the version number is incremented before the program is saved. This way, the program does not have to be run twice before the auto-update is effected.

Second (line 20), it is not too difficult to add an auto-update LOAD on another function key.

```
Mozart = 4; Schubert = 8.5;
Brahms = 4; Beethoven = ?
```

£5 Escape from the Mouse trap

THE AMX Mouse seems to have broken the peripheral barrier with many of you, and become a firm favourite. Gerald Fitton of Swindon, for one, has come up with an interesting way to design his own backgrounds using the icon design program. Gerald explains the technique:

*RUN the AMX Art program. Pull down the Options menu and select *COMMAND. Now *SAVE ICONS0 4800+400. This will save all the icons used by the Art program. Leave the Art program and run the icon Design program. Load your ICONS0 in the usual way.

You will find the 32 background textures are in the last eight icons (four textures, one in each quadrant of each icon). Modify these as you please (but don't change the upper left quadrant of icon 31 or you won't have an eraser) and then save them using the Design program in the usual way as, say, ICONS1. You will find that each texture is in fact an 8x8 grid of pixels. This gives plenty of scope for variety.

Now press CTRL and Break and do the following:

```
*LOAD ART
*LOAD ICONS1 4800
*SAVE ART1 1900+3400 1903
```



You're not tied to backgrounds like these with Gerald Fitton's technique

Beeb Forum listings 1 to 6 are on yellow pages 106-107

You can now *RUN ART1 and it will contain your new 32 background textures, which will be displayed and can be used as the bricks, etc, were before.

If you are an advanced user who wants an alternative text style, I suggest you *SAVE a block of &400 bytes between &4400 and &4800 in the same way and have a look at it!

Beating

the clock

IF YOU write machine code for its running speed, you'll obviously be interested in getting some timing results—perhaps of certain subroutines to see where sections of code are not particularly efficient. Neil McFadyen of Birmingham provides just such a timing routine (listing 4) to seek out these stragglers. Neil says...

The program utilises the user VIA with timer 1 running continuously. An interrupt is generated when the timer reaches zero and the service routine increments a single-byte counter at location &80. This means that up to 2^{24} cycles can be timed (approximately 17 seconds at the VIA clock rate).

A maximum precision of two cycles is possible as the VIA runs at half the speed of the CPU. Accuracy is lost when timing long routines as the 6502 performs other tasks for the MOS; however, this does not reduce the usefulness of the program.

The code in this version assembles to &A00 and the program should be loaded with PAGE=&6600 in mode 7. On assembly, two addresses are given, one for the routine which starts the count and the other to stop it.

The source code to be tested should be loaded at *E00. It's also helpful to insert the following line at the beginning:

```
timeron = &A00: timeroff = &A65
```

Now, to use the timer, insert the following lines in the source code at the required points:

```
JSR timeron
JSR timeroff
```

Ensure that both these commands are actually processed, otherwise the computer will lock-up.

Run the program and on completion, press f0 for the result.

The variable fact2% was intended to account for the number of cycles added by the program and OS interrupt handlers, but the accuracy after 65000 cycles is not high enough to make the effort estimating it worthwhile.

£5

The key to even more colours

CHIGWELL in Essex evidently has some colourful characters: one of them, D Litvin, has found a way of producing 256 colours in mode 2. Mr Litvin explains: It should be possible to mix two colours on the screen, in order to produce a number of new ones. Memory location &359 holds the current graphics foreground colour. If you type in the following:

```
MODE 2
?&359 = &12
DRAW 1000,1000
```

a line of blue and red dots is plotted. This is because location &359 can store two colours instead of one (it is treated like a byte from mode 2 screen

memory). Figure 1 shows how the two colours are stored in &359. So to use cyan and magenta you must type:

```
?&359 = &39
```

B Gabel's article in the November issue has a table showing the number applying to each set of colours. Using this, it should now be quite easy to shade a region with a set of colours, thus making a new colour. This is demonstrated in the program listing 5, which displays some of the possible colours available. For a new set, press any key.

It is possible to change the mode and the program will still work. Even in a two-colour mode, there are a large variety of shades available.

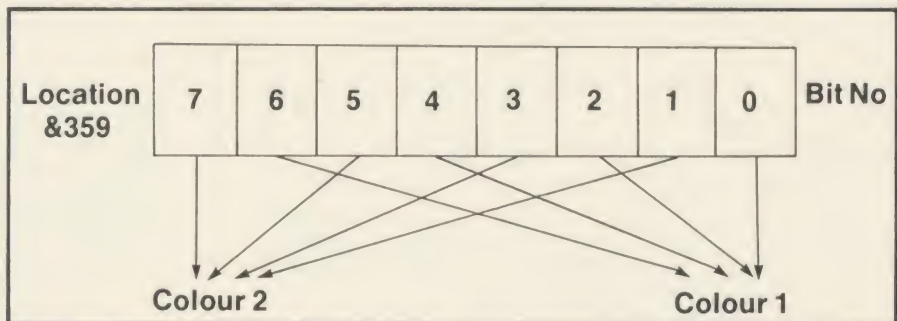


Figure 1. How two colours are stored in &359

£10

Novel Wordwise

line-up

A USEFUL program that allows you to type in pages of text in *Wordwise*, and then access them as separate mode 7

In the computer football league, all played all once. No match produced the same score as another.

	Goals				
	W	D	L	F	A
Acorn	2	0	1	5	1
Sinclair	2	0	1	3	5
Commodore	1	0	2	5	6
Atari	1	0	2	4	5

How many goals were scored when Acorn played Atari?

pages has been sent in by Miranda Williams of London (listing 6). Colour and double height characters can be added using a suitable Teletext editor.

To use the program:

- 1) Type in the *Wordwise* text as normal.
- 2) Set the left margin to LM2 to provide space for the teletext control characters.
- 3) Set the line length to LL36.
- 4) Insert any other formatting commands, such as JO for justification and BP to force a new page. For fully formatted text use EP, PL25, PP, DH and DF as you wish.
- 5) Spool the text using option 8.
- 6) Load and run the program, supplying the necessary filename.

The file is split into 25-line blocks which are *SAVED as PAGE1 to PAGEn, with each page being one mode 7 screen. These pages can be loaded in and edited as required. Basic II users can omit the PROC from line 230 and use OSCLI direct. Lines 300 to 340 can also be omitted.

Beeb Forum is a platform for ideas, tips and applications relating to the BBC micro and the Electron, intended for experienced programmers to share their thoughts. For every reader's tip published we pay £5—or more for something special. Contributions should be typed or printed, with substantial listings on cassette. WRITE TO Beeb Forum, Acorn User, Redwood Publishing, 68 Long Acre, London WC2E 9JH.

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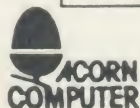
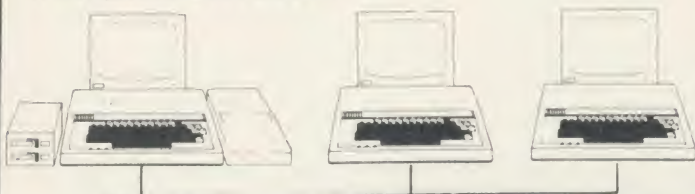
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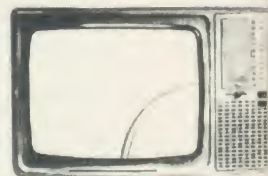
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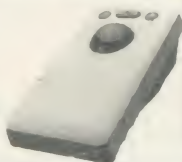
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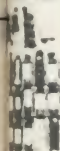
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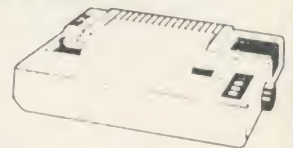


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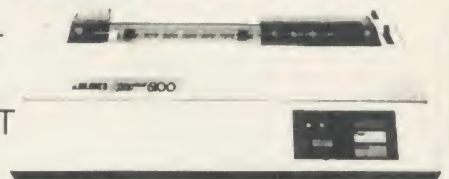
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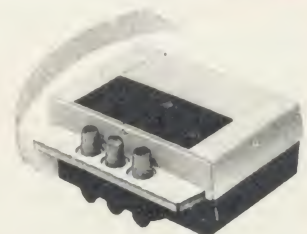
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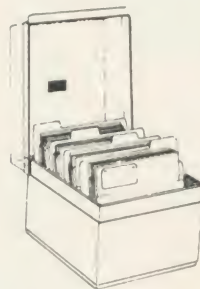
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After looking at ways of measuring electrical resistance, Paul Beverley now describes the construction of an analogue port input voltmeter

119

HIGH VOLTAGE

IF WE have a means of measuring voltage we can then go on to use the computer to calculate current, assuming that we can tell the computer the value of the resistance across which the voltage is being measured.

The voltages we want to be able to measure are going to be too large to be applied directly to the ADC input, which can only measure up to about 1.8 volts, so I have provided a circuit which cuts down the input voltage and also gives some degree of protection against excessively large voltages.

Voltage probe hardware

The voltage probe (figure 1), which was designed by two colleagues, Nigel Eames and Geoff Osborne, will allow you to measure voltages up to 30 or 35 volts dc and 20 to 25 volts ac, depending on the exact reference voltage in your computer. The probe circuit consists of a potential divider formed from two pairs of resistors ($R1 + R2$) and ($R3 + R4$).

The transistor TR1 gives over-voltage protection to the ADC inputs, and the diode D1 both protects it against reverse voltages when measuring dc, and acts as a rectifier for ac measurements. Capacitor C1 reduces the amount of noise pick-up on the input line to the computer and also acts as the reservoir or smoothing capacitor for ac measurements.

The top half of the potential divider has been made up from two separate

resistors for a number of reasons. First, by connecting the diode D1 at the junction of the two resistors we enable it to perform the dual functions of protection and rectification. The only disadvantage of doing this is that the input impedance of the probe is lowered when measuring ac. However, it is still considerably higher than most moving coil meters and more than adequate for most purposes.

Secondly, from a purely practical point of view, it is easier to obtain high stability components with lower resistance values, and it is the long-term stability of these components rather than their actual tolerance which is the important factor. Thirdly, the very fact of having two components on the circuit board instead of one is a safeguard in itself. In the event of one of the components becoming short-circuited, either by component failure or by a wiring error, the ADC input is still protected by the other resistor together with the protection network.

Remember that you could be connecting anything up to about 30 or 40 volts across this circuit and protection for the computer must be maintained at the highest level. For this reason it would be best to mount the circuit board inside an insulated box so that there is no possibility of a high voltage point on the circuit under test touching the sensitive ADC input. The prototype was made on a piece of printed circuit board and mounted in an old tooth-brush box. There is no reason, though, why you shouldn't mount the components on stripboard (such as Vero-board) and put the board in an ordinary plastic box, using flying leads both for

the 15-way plug and for the connections to the circuit under test.

The lower half of the potential divider is formed by the resistors R3 and R4 in series. The base-emitter junction of TR1 is placed across R4 and the collector-emitter connections across both R3 and R4. When the probe is applied to an unknown voltage, a very small current – only about 3 microamps at maximum – flows through the whole of the resistor chain. As this current passes through R3 and R4, a voltage is produced which is proportional to the voltage at the probe tip. This is the voltage which is applied to the ADC input.

The transistor TR1 is normally switched off (ie, has a high resistance between collector and emitter) and does not affect this voltage. However, if the voltage applied to the probe becomes too high, the voltage developed across R4 will be sufficient to start current flowing in the base-emitter junction. This tends to turn the transistor on and decreases the collector-emitter resistance. The circuit is designed so that the transistor does not start to switch on until the input voltage gets above the measurable range, otherwise this would affect the linearity of the measurement. However, the design is such that even if the input voltage rises to as much as 100 volts, the voltage applied to the ADC input never rises above 3 volts. And even this is still somewhat less than the absolute maximum that you can safely apply to the input (5 volts).

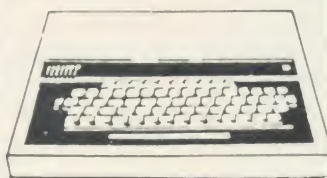
When measuring dc, the diode D1 is normally reverse biased and does not affect the operation of the circuit. However, if the connections to the probe are

Paul Beverley's program to run the Voltmeter is on yellow page 108

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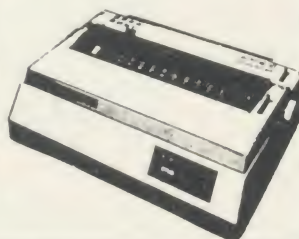
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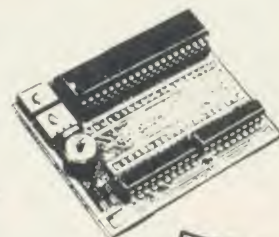
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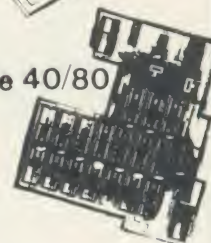


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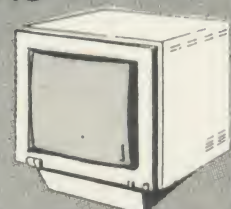
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reversed, the diode becomes forward biased, conducts and therefore prevents the ADC inputs from becoming more than a fraction of a volt negative. When making ac measurements, the diode conducts on the negative half cycles and thus only allows the capacitor C1 to become positively charged.

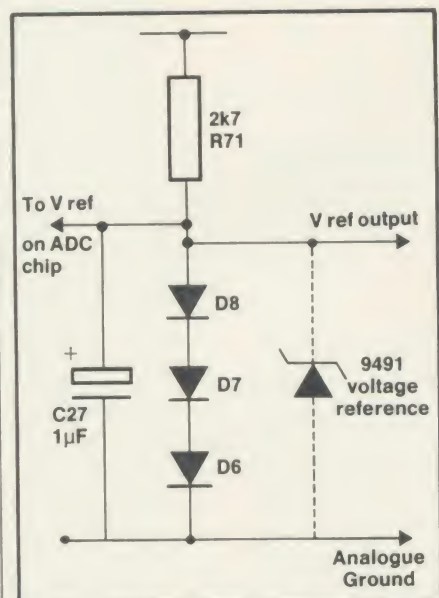


Figure 2. ADC voltage reference circuit showing extra voltage reference diode

Calibration

While the accuracy obtainable with this simple circuit when measuring ac is not as good as from electronic meters, it is perfectly acceptable if care is taken when calibrating. The best accuracy on ac is obtained from a calibration point

of 10 volts, ie, about half scale. Under these conditions, the readings were at worst only about four per cent out at the ends of the scale (0-20 volts). When measuring dc, the results were much better. From a calibration point of 15 volts, the readings were within one per cent of those given by a commercial digital voltmeter.

Remember, though, that the voltage standard within the computer, against which we are measuring, is not a very accurate one – hence the need for calibration. You need to use high stability resistors for the probe so that variations of the component values over a period of time are minimised. Even so, you will find there is a good deal of drift in the accuracy of the voltmeter as a whole. If you apply a constant voltage from a stabilised power supply to the probe input you will find that as the computer warms up, the measured voltage varies by something like five or six per cent. After an hour or so this should stabilise a little, assuming that the room temperature is not varying too much, and the variation should be less than about one per cent.

This is quite adequate for most purposes, but for the highest accuracy you could, in a school or college laboratory, use a Weston standard cell connected to one of the other ADC inputs and calibrate the probe relative to that. It is perfectly safe to apply one of these cells directly to the ADC. Because the voltage is only just over one volt, it will not damage the ADC input, nor will it harm the cell since the impedance of the ADC input is about 10 megohms.

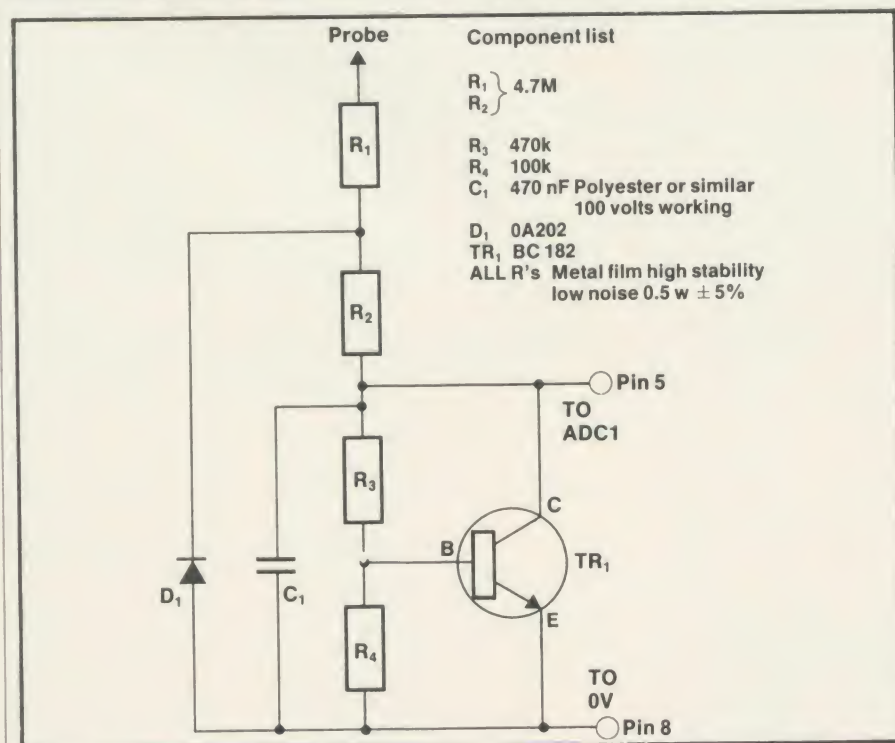


Figure 1. Voltage probe hardware

If you want better accuracy, and do not have a Weston cell available, you will have to use some other voltage reference source. One possibility is the 9491 low current band gap reference diode which gives a reference voltage of 1.22 volts. Since this is less than the 1.8 volts of the internal reference, you can simply solder one of these reference diodes into the 15-way plug between pins 11 and 5 or 14 and 8. You could, in theory, mount it on the circuit board with the other components, but it is important for the correct operation of the ADC that you have the reference voltage as close to the chip as possible. Best of all, therefore, would be to go inside the computer and solder the reference diode directly across the three diodes (D6, D7 and D8) that form the voltage reference (see figure 2).

However, it is *not* a good idea to start doing anything inside your computer unless you are reasonably good at soldering and know how to read circuit diagrams, and you should realise that doing so would obviously void the warranty on the computer. If you are sure you know what you are doing, you should refer to figures 3 and 4 which should help you to work out exactly where to solder the diode. But it is difficult to give exact instructions as to how to do this because the component layout is different on the different issues of the printed circuit board. If you have a board layout which is different from those illustrated, you will have to sort out for yourself exactly where to solder the diode.

Having done some tests with a single 9491, I have discovered that by reducing the reference voltage I substantially increase the amount of noise generated by the ADC chip, which is bad enough as it is. It would be better, therefore, to use a higher voltage reference. You could for example, as I did, use two 9491s in series, but as this gives a voltage (2.44 volts) which is higher than the existing voltage reference you would need to disconnect the existing diodes.

You do not need to remove them altogether. It is quite sufficient to cut carefully through one of the diode leads with a pair of side cutters. The two 9491s could then be soldered inside the computer across the existing diodes in the same way (figures 3 and 4) as for a single diode. However, it is *not* a good idea to mount these diodes in the plug itself. If you did, removing the plug would leave the ADC chip with no voltage reference device and therefore +5 volts would be applied to its Vref input.

Voltmeter software

The program to run the voltmeter (listing: page 108) gives a display of the voltage and also allows you to record

on the screen up to four voltages in case you want to remember them for purposes of comparison. To put the most recent voltage value into one of the four memories, simply press the M key. To escape from the program, just press Return. If the voltage reaches the top of the range that the ADC input can measure, a sound is emitted to warn you that the input voltage is getting too big.

The program starts by asking for a calibration voltage. At this stage, if you press Return, it assumes the calibration factor in line 40 and carries on with the measurement. If, on the other hand, you do wish to change the calibration, you apply the probe to the calibration voltage, type in the value of the voltage, then press Return. If you wish to maintain this new calibration for future use, you stop the program by pressing the Return key again and then type:

PRINT scalefactor

You can then put this new value into line 40 and save the program again. If

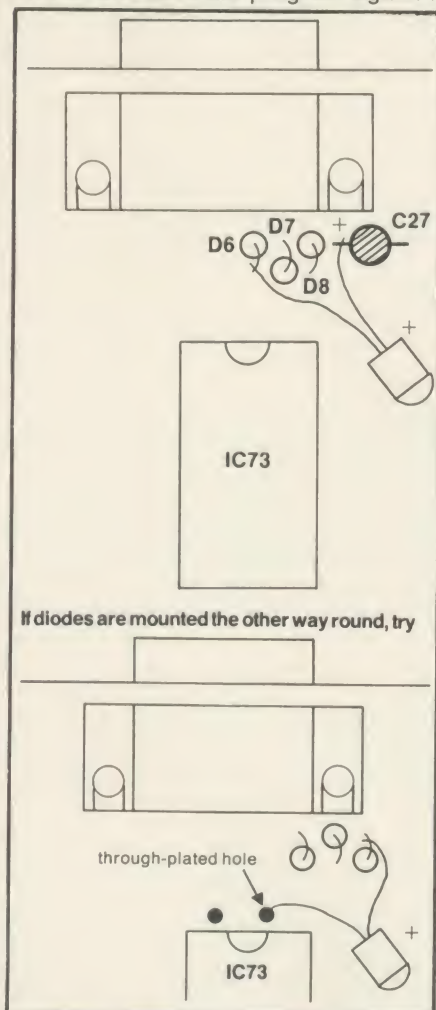


Figure 3. Fitting a 9491 voltage reference diode inside the computer on PCBs issue 2 and 3. (If two diodes are to be used in series, cut through the lead of diode D7)

you want to work to the highest possible accuracy, you should allow the computer to warm up for at least half an hour before you do this calibration.

If you want to be able to resolve small differences in voltage, you will need to use longer averaging times because of the noise inherent in the ADC chip. Function keys f0 and f1 are programmed to double and halve, respectively, the averaging times for the measurements. Statistical theory tells us that in order to halve the random variation you have to average four times as many readings.

The program consists, after initialisation, of a loop in which the voltage is measured and scaled (line 80), the value is printed out (90, 100) and if the M key is pressed, the most recent value is printed out in one of four positions at the bottom of the screen, and the position is incremented by 10 (line 110). If the position has reached 40, ie, off the edge of the screen, line 120 restores it to zero so that the next time M is pressed, the voltage will be recorded in the first position. Line 130 looks for another key having been pressed, and if it is a function key, the averaging time is changed (140), but if it is Return (150), the program is exited.

The reading of the ADVAL value is done with averaging (210-280). The number of samples is set by the value of samples%. At line 270, a sound is generated if the input voltage reaches the top of the measurable range. The initialisation procedure (300-470) allows the user to choose to calibrate the probe against an external voltage source and sets up the screen reading for the voltage display.

Modifications and applications

It is possible to measure higher voltages than 30 volts. If you put two more 4.7M resistors in series with R1 and R2, you could measure up to about 60 volts, but I don't think it's wise to use the computer to measure voltages much higher than that. You may disagree, but that is up to you to decide. If you wanted to use more than one range and have a range switch, you might think of using a push button on the probe to short out the extra resistors you had added. If the components are mounted in a separate plastic box, you could include a rotary switch to select any number of series resistors for different ranges.

If you have a second set of contacts on the switch, you could use a separate potential divider to feed a voltage back to the second ADC input so that the computer could sense the switch position. However, making this kind of modification increases the likelihood of accidentally damaging your computer, so I have not given any circuits.

If you use the higher voltage reference of the two 9491s with the component values given in figure 1, you will find that the range has increased up to about 40 volts. If you want to bring the range back down to more like 30 volts,

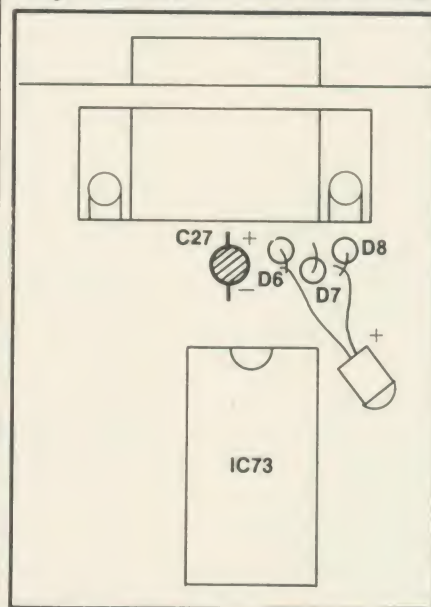


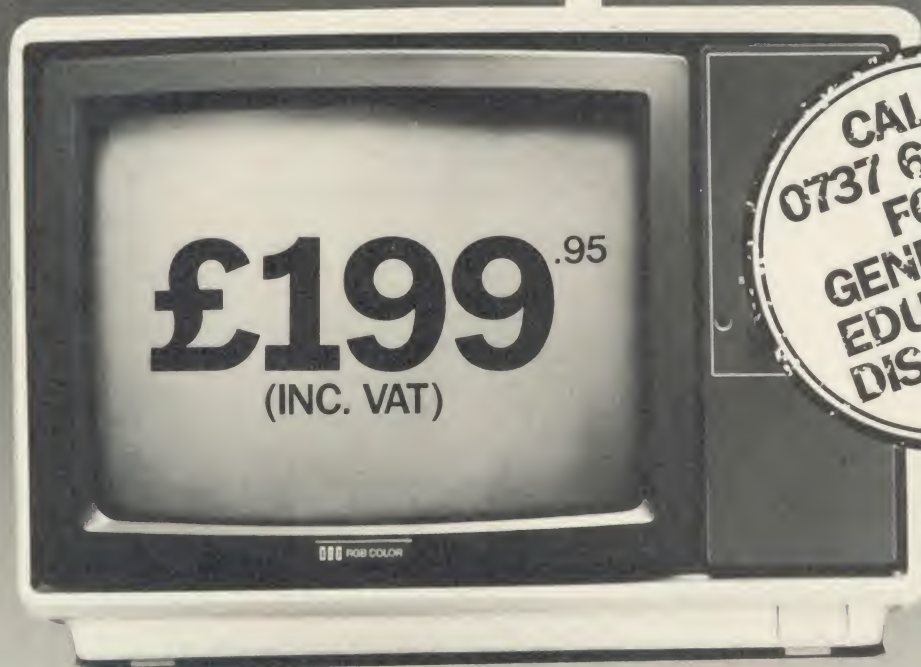
Figure 4. Fitting a 9491 voltage reference diode inside the computer on PCBs issue 4 and 7. (If two diodes are to be used in series, cut through the lead of diode D7)

change R3 to 680k. Also, at the top end, as the input voltage rises towards the 2.44 volts of the reference, the transistor will begin to switch on, thus reducing the linearity. To stop this happening, you should reduce R4 to 82k.

Once you can get the computer to measure voltage, there are all sorts of applications that you could try. For example, you could do some quite complex automatic testing of components and circuits by making up four probes, one for each of the ADC inputs. Or it would be very simple to test a circuit for resonance by generating a square wave out of PB7 on the user port, and using the probe to measure the voltage across the resonant circuit.

One last thing that is important to realise is that the voltage you are measuring is with respect to the zero volts line of the computer. Therefore, you must be very careful *not* to measure voltages on a circuit that has, like many older television sets, a 'live' chassis. Also, if you are going to be using more than one probe, you must always be measuring with respect to one particular point in the circuit under test – usually the zero volts line of the power supply. If you do need to measure voltages with respect to different points, you will have to use two probes applied to the two points between which the voltage is to be measured, and get the computer to calculate the difference between the two voltages.

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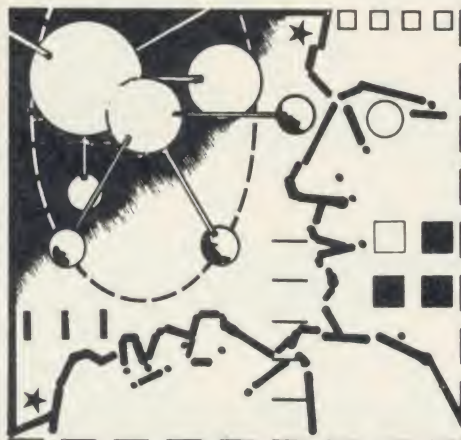
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Find the lady

THIS month we open our proceedings with a short listing for 'Find the Lady', the invention of David Hambly of Essex, who bought his Atom recently for less than £20! He is a professional magician, a member of the International Brotherhood of Magicians and author of the ZX-81 based book *Computer Magic*.

I have polished Mr Hambly's program slightly (see listing below), but I think his listing is a pretty good effort as he tells me he has only had his Atom for six weeks. Nevertheless, I gather that the Atom is already in use in his professional magical work, and that he is converting his existing Spectrum material to run on the Atom – a demonstration of confidence in our machine if ever there was one!

Ignorance

isn't bliss

I RECEIVED the following plaintive letter from A Bolton of London...

Some months ago I bought an Atom

because (a) I wanted to learn 6502 machine code and (b) it was cheap. Or possibly vice versa. Having got the hang of it, I've become quite enamoured of the machine and I've run into a major hurdle: I don't really know anything about the thing.

The Atom manual mentions a Technical Manual, which I don't have. I don't know anything about the extension bus or the VIA connector. Inside, chips IC1, IC2, IC3, IC4, IC5 and IC50 are missing, together with another chip also apparently labelled IC2, which I suspect is the extension ROM.

I haven't the foggiest how to hang a printer on the thing, and it doesn't have an RS232 so it can't even talk to any of my other computers. Who can supply me with information? And are there any people/companies still supplying software/hardware for the Atom?...

The Technical Manual is mainly for those who bought their Atoms as kits long ago (1980). It does not tell you very much that you can't find elsewhere, except how to build the kit. The chips you need for the printer port are:

IC1 6522
IC50 74LS244

A 26-way right-angle connector should also be fitted in position PL5. A BBC micro printer cable will then connect

the Atom to a Centronics interfaced printer, and CTRL-B and CTRL-C turn the print stream on and off.

To set up the extension bus, you will need:

IC2 & IC3 81LS95 or 74LS465
IC4 8304
IC5 74LS30

IC4 is getting quite rare, so it would pay to find one soon if you are contemplating future expansion. Again, a connector would be needed for the expansion bus, but its type and fitting depend on the end user. There are also technical limitations and requirements for bus-fitted devices, which I will be discussing in future issues, so watch this space before diving in headlong.

The user VIA port addresses are given in *Theory and Practice*, page 169, but programming the 6522 is a study in itself. I recommend *6502 Assembly Language Subroutines* by Leventhal and Saville (publ. Osborne/McGraw-Hill 1982) for the serious machine code enthusiast.

Finally, Vector Marketing or Acorn itself should be able to put you in touch with people still handling the Atom.

Crystal connection

FURTHER to my recent comments on disc controllers for the Atom (*March issue*), I have investigated a bug in the system, reported by several users.

Some disc users have found that the Acorn FDC card with the on-board crystal oscillator (and the early or user-constructed CUBE FDC card) occasionally seems to lock up and fail to work on power-up. I have had this problem once or twice, and found that the only way out was power down and try again. I think I have now found the answer.

The problem seems to be due to an unstable crystal oscillator. When I put a 'scope on the oscillator during such a lock-up, I found it happily running at 8MHz instead of 4MHz – twice its expected speed. The theory behind this is quite complex, but suffice it to say that the 8271 cannot service a 5¼ inch disc at the double clock speed.

The crystal oscillator consists of a pair of inverters (7404 or 74LS04) con-

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110 P."*****THREE CARD MONTE*****"
120 P."*****BY- david hambly*****"
130 P.""
140 A=ABSRND*3+1
150 F.X=1T05
160 P."    xxxx    xxxx    xxxx"
170 N.
180 P."          >1<          >2<          >3<"
190 IN."FIND THE LADY. 1,2 OR 3"Z
200 IFZ=A;G.230
210 P."wrong IT WAS>"A"< TRY AGAIN"
220 G.240
230 P."well done""HAVE ANOTHER GO"
240 F.X=0T0150;WAIT;N.
250 RUN
    
```

David Hambly's 'Find the Lady' listing

nected in series via a capacitor. Each inverter has a resistor connected across it, and the crystal is connected across the whole thing (figure 1). The resistor values have to be increased to 1000 ohms, and a small capacitor (22pF) added between each leg of the crystal and ground, to keep the oscillator stable at its proper frequency (figure 2). The capacitors are a standard modification to the later CUBE cards, but they alone still do not entirely eliminate the problem.

The capacitors should be fitted to the reverse of the board (the opposite side to the other components), and grounded to any convenient ground track. The green resist coating can be carefully scraped away to reveal a small area onto which they can be soldered. The capacitors should be of the tubular polystyrene type, and must *not* be tacked down with superglue: they will dissolve in it. Also, soldering time must be kept short, or they will overheat and melt.

Please note that you should not carry out this modification unless you have the lock-up problem and you are pretty familiar with soldering and PCB tracing. Unless you are fairly skilled you can damage the board while removing the old resistors, and if the FDC is working properly anyway, there is no point in fiddling with it.

Assembler

label bug

PLAYING recently with my Atom assembler, I was called upon to use a very large number of labels (about 200). For clarity, I decided to allocate a different array name to each major subroutine and dimension a dozen or so labels for each. This is in general good practice, as it is immediately apparent which section of the program a JSR, JMP or longish branch goes to.

While writing this mammoth program, I found a horrible bug which is not documented anywhere, as far as I know. While it is obvious to any assembler programmer that the Atom variables A, P, X, Y should be reserved to avoid confusion in fact the only variables it is essential to reserve are A and P. X and Y are discriminated syntactically from the X and Y registers of the 6502 during assembly. This makes sense when you realise that the assembler is only writing machine code, not running it.

P, of course, is modified as assembly proceeds, and the assembler cannot discriminate in, for example, ASL A whether you are requesting a shift of

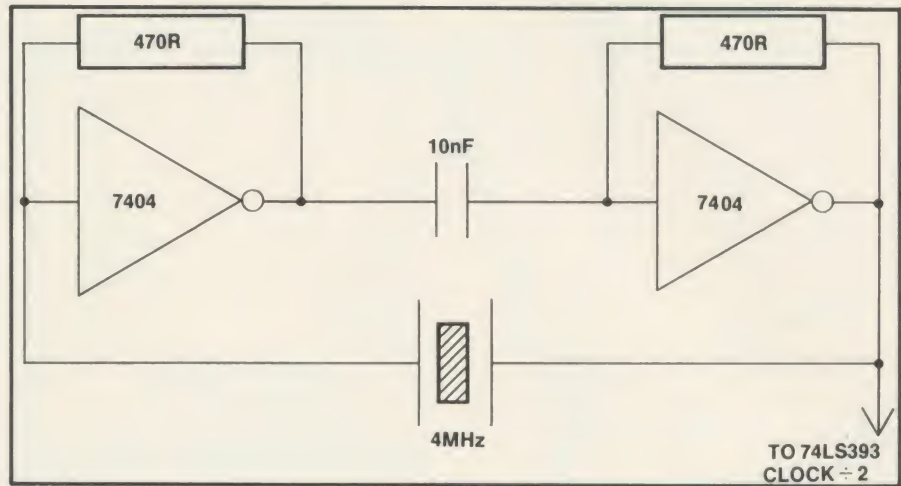


Figure 1

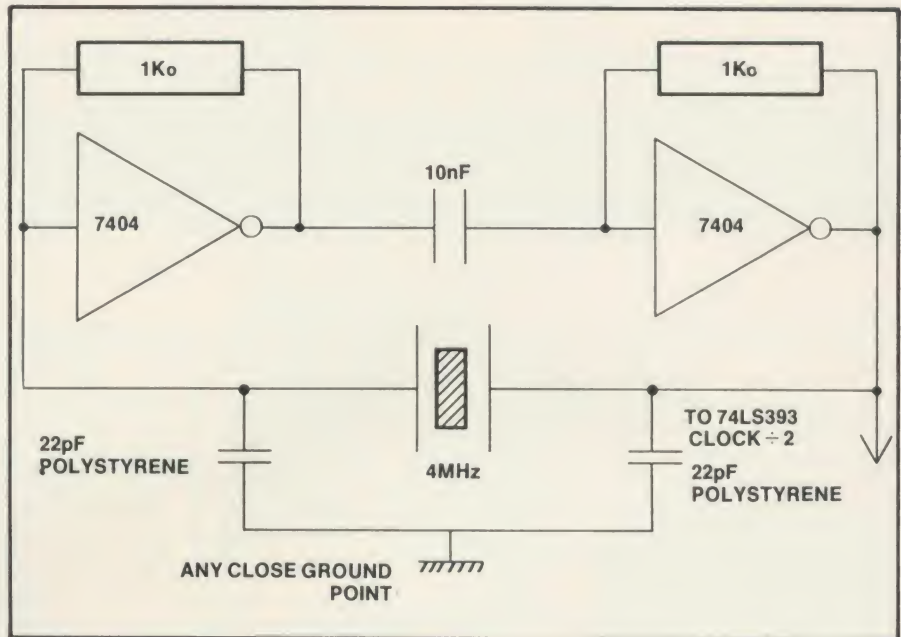


Figure 2

the accumulator or of memory location A. X and Y as operands modify the selected OP code, and as variables hold values. They can therefore serve the dual purpose, although with loss of clarity.

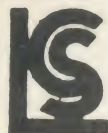
However, to our bug ... *Atomic Theory and Practice* states that 'any of the array variables AA-ZZ may be used as labels in the assembler ...' (page 171 and elsewhere). *Be warned!* The Atom seems totally unable to accept the label AAx as the parameter for the JSR or JMP OPcodes with forward references. In any case, a label used for such a forward reference should be equated with P outside the assembler two-pass loop, but for some reason the label AAx is not assigned by this procedure.

The principle behind the error result when using any other array label is very simple. An unassigned assembler label may point to any address. If by chance it points to a zero page address,

the Atom throws it out if the OPcode is a JSR or JMP, as JSR or JMP to zero page are disallowed in Atom assembler. The presetting of the label to any arbitrary value which is not zero page prevents the error terminating the assembly.

I can see no obvious reason for the special case of AAx. Even a trace of the assembly process has not shown anything up. Any readers who have had this problem, or who would like to experiment and establish why it occurs, are invited to send in their findings. A good answer with documentary proof could win you some nasty little chocolate coins (or nearest equivalent).

A tip for those without the urge to investigate: if you have used AAx in this manner and you keep getting Assembler Error (156) at the relevant point, try changing the label name before despairing and assuming you can't type.



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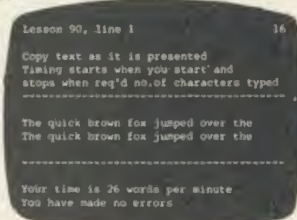
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Starter pack based on *View*

A STARTER pack for businessmen to introduce them to standard software and techniques is set for release from Acornsoft.

Included on the disc will be cut-down versions of the company's own wordprocessor, spreadsheet, database and desk diary, with examples of what can be done, such as holiday wall charts.

The idea was tried out on the Beeb in 1983 in a package designed to introduce local government officials in the country's town halls to computing. This was a much larger set of software covering a wide range of applications and has been a success, producing a 'surplus' (they don't make profits) for the local authorities behind it.

Acornsoft's pack will cost £52 (plus VAT). The wordprocessor will be based on *View*, which comes in ROM for £60. The mini version will be loaded in from disc and only runs in modes 6 or 7 with just a third of the functions normally available.

The spreadsheet will be a similar version of *Viewsheets*.

Acorn reviews ABCs

THE future of Acorn's range of business computers, the ABCs, is to be decided this month. Elserino Piol, who masterminded Olivetti's deal with Acorn, has said there will be no product overlap, and will undoubtedly want a say in Acorn's strategy.

Under the new management at Acorn the range will be switched into the scientific and technical division under Jeff Tansley, formerly leader of the 32016 project team.

Alex Reid, the company's acting chairman, described this as 'refocusing', but it appears more fundamental

than that. The setting up of a chain of business centres has ground to a halt and production machines have yet to appear.

The business division in Acorn will handle the Communicator, due to appear in the summer, and Chain, a communications terminal based on the Electron.

Both these products will be sold to other companies to put their own badges on, so there will be no Acorn launch as such, although the Communicator is seen as having a future in the home.

The Communicator is a 16-

bit computer with built-in communications, LCD screen, disc or micro cassette storage and software. The general approach of the machine is similar to that adopted by ICL with the One Per Desk based on Sinclair's QL.

The Chain terminal consists of an Electron with an intelligent modem, extra memory and communications software. British Telecom's Merlin division is to market this under the snappy title of M2105, initially as part of a communications system for the health service known as Healthnet.

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A typical network of timed activities

Spreadsheets for small companies

INTEGRATED accounting packages whereby data can be passed between all the different parts of the system – sales, purchasing, invoicing, etc – appear to be the flavour of the month.

Three systems ranging in price from £115 to £500 have appeared recently, all of them claiming to do similar jobs, although the way they perform the tasks, and to what depth, will be the deciding factors in choosing one.

Gemini's suite is the most expensive at £99.95 for each of the five modules. These cover purchase ledger, nominal ledger, invoicing and sales ledger, stock control and payroll.

Double disc drives are needed to make the best use of the software. The company also runs a back-up service for £12 a year and will supply

printed stationery for use with the software.

Next is Diamondsoft's system which has been upgraded with a database and covers five tasks. Each part costs £30 and will work from a single, 40-track disc.

Finally, DTCTrader is designed to cope with day-to-day bookkeeping, and balance sheets can be extracted from it. It costs £115 and runs from one disc. DTC is at 145 Thorney Leys, Witney OX8 7NS.

All the above are available on either 40 or 80 track disc formats.

Critical path software

CRITICAL path analysis is a technique used to calculate the minimum time needed to complete a given project. Now there is a piece of software designed to do the job which can be run on a BBC micro using either a Z80 or a 6502 second processor.

A simple example is the Sunday lunch, where the critical path is through the cooking of the roast and the making of the gravy (assuming the meat juices are needed for the gravy) – everything else can be done while these two tasks are underway.

With more complex jobs the important factors are much harder to analyse, and that's where the computer comes in.

The ICPA software is used to build up a network of activity paths on the screen, each of which has an estimated time. From this the software will give the latest start and finish time for the activities and identify the critical path.

Networks are entered on the screen with a joystick. Data is entered by selecting an activity and calling up a text window containing prompts for the necessary information.

ICPA was scheduled for release at the start of April at an estimated cost of £150 (plus VAT).

It comes on either 40 or 80 track discs and is marketed by Cats Ltd at 5 Treeview, Broadfield, Crawley RH11 9QH. Tel: (0293) 548068.

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THE WORD ON MEMOPLAN

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Edward Brown assesses the Z80's wordprocessor

THE FREE software provided with the Z80 second processor includes the wordprocessing package *MemoPlan*. This is a cut-down version of a larger package consisting of wordprocessing, document processing and print processing programs. The *MemoPlan* package supplied by Acorn omits the document processing program and some features of the word-processing one.

Also, the configuration program CONFIG.COM has been modified to omit many of its features, but some of these can be replaced, and later in this article you'll find how to do this. The files supplied by Acorn for *MemoPlan* on the Z80 second processor are shown in figure 1. At this stage it's best to take a copy of your *MemoPlan* disc if you wish to follow the examples in this article.

The booklet supplied with the *MemoPlan* package is a general introduction and is good to get you started but does not cover all aspects of the package. Before going on to discuss the programs in more detail I'll look generally at the way *MemoPlan* works.

How it works

MemoPlan consists of an editing and a printing program that work together to produce a wordprocessing facility. When *MemoPlan* is entered by typing MEMO the program MEMO.COM is loaded into memory and executed. This program uses a file called MEMO.SWP to keep a temporary record of the files that it is editing. The file that you were last editing is displayed on the screen and the text that you enter is stored in the temporary file MEMO.SWP. This means that if at any time *MemoPlan* should crash (eg, CTRL Break instead of CTRL F9), you will have lost very little text. Running RECOVER will get back

all except the last few characters for you.

You can save the file you are editing at any time by writing it to disc. Many documents can be loaded into *MemoPlan* at the same time. When you change from one to another you are automatically put at the position you were when you last selected that document. The print option allows you to do this painlessly from within *MemoPlan* by chaining to MEMOP.COM which prints the file for you. Alternatively, you can print using MEMOP.COM directly from the CP/M command level. Of the other two programs, RECOVER.COM allows you to create and repair MEMO.SWP, and CONFIG.COM allows you to select the type of printer you wish to use.

Command line program options

The three programs MEMO, MEMOP and RECOVER all have CP/M command line options which can be very useful but are not well documented in the *MemoPlan* booklet. I'll look at these

options in more detail and examples of each are given in figures 2, 3 and 4.

MEMO

The 'normal' way to enter the editing mode of *MemoPlan* is to type the command MEMO by itself. The wordprocessor starts working and presents its screen ready for you to edit. However, if you type MEMO followed by a file reference, *MemoPlan* will load the file specified into its main document area overwriting whatever document is there. The main document area is the one you were presented with the first time you entered *MemoPlan* – it may not be the one you were editing last. This facility is useful when editing programs.

In addition there are two options, -W and -P, for controlling the entry into *MemoPlan*. -W will wait before clearing the screen after the title screen. This means that information on the screen can be read before the screen is cleared and is useful if *MemoPlan* is used as part of a SUBMIT command. -P must be followed by a file reference and instructs *MemoPlan*

```
A>DIR
A: MEMO          OVL : MEMO      COM : MEMOHELP  TXT : MEMOP    COM
A: MPP           OVL : RECOVER   COM : CONFIG   COM : CONFIG   DAT
A: ACTIONS      DEF : MEMO      SWP
```

MEMO.COM The main section of code for *MemoPlan* editing program

MEMO.OVL Extra code for *MemoPlan*, loaded into memory when needed

MEMOP.COM The main section of code for the *MemoPlan* print program

MPP.OVL Extra code for *MemoPlan* print program, loaded into memory when needed

RECOVER.COM The *MemoPlan* text recovery program, used to create a swap file and recover data when *MemoPlan* has crashed

CONFIG.COM The *MemoPlan* configuration

program, used to set up *MemoPlan*

MEMOHELP.TXT The file containing the help messages displayed by the *MemoPlan* help facility

CONFIG.DAT The file containing the predefined printers and terminals, and the configuration information set up by CONFIG.COM

MEMO.SWP The file used for temporary storage of text being edited

ACTIONS.DEF The file containing the list of possible actions in *MemoPlan*

Figure 1. The files supplied by Acorn for *MemoPlan*

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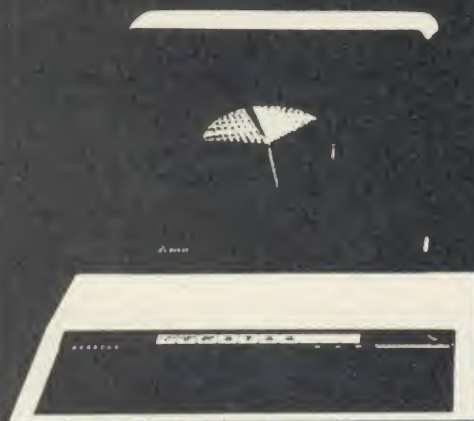
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to start printing the file specified while editing is in progress.

—PORT and —P are options to MEMOP and MEMO respectively which do produce output. They are not supported by Acorn and are given in the article for completeness. Try them with your copy of the *MemoPlan* disc to see the results.

MEMOP

The normal way to enter the printing mode of *MemoPlan* is through the print command in MEMO, which will print the document you are currently editing after asking for any options. The document is then transferred to a temporary file called MEMO.F\$\$ and MEMO chains to MEMOP via the MEMO.OVL overlay and prints the file. It's also possible to enter MEMOP followed by a

MEMO Will put you into *MemoPlan*
MEMO TEST.TXT Will put you into *MemoPlan* and overwrite the main document with the file TEST.TXT
MEMO —W Will put you into *MemoPlan* but wait before clearing the screen
MEMO —P TEST.PRN Will put you in *MemoPlan* and print the file TEST.PRN

Figure 2. CP/M command line options for MEMO

MEMOP —5 LETTER.TXT —P —DEV DiabloPS Will print five copies of the file LETTER.TXT on the device DiabloPS (a proportionally spaced Diablo printer) and pause between each page to allow sheets of paper to be inserted

MEMOP DRAFT.TXT —T "draft copy" —O DRAFT.PRN —L10 Will place the formatted text into a file called DRAFT.PRN with a left margin of 10 characters and a title of 'draft copy' on the top of each formatted page

MEMOP TEST2.TXT —NP —Q —NH —NM —PAGE 3 Will print TEST2.TXT starting at page 3 without pausing for sheet insertion, without putting messages on the screen and with no header or margins

MEMOP TEST3.TXT —PORT CONSOLE —R 55 —TAB 8 Will print TEST3.TXT on the printer connected to the console output port with a right margin of 55 and tabs every 8 character positions

Figure 3. CP/M command line options for MEMOP

RECOVER Will recover as much text as it can link to a document

RECOVER —ALL Will recover every piece of text whether sensible or not

RECOVER —CREATE 100 5 Will create a new MEMO.SWP file of 100 pages containing five documents

Figure 4. CP/M command line options for RECOVER

file reference and options on the command line. The options described below are equally valid on the command line and in MEMO.

—nn Where nn is the number of copies that you want

—P Pause after printing each page. Used for single sheet feeding

—NP No Pause after printing each page. This is the default setting

—PAGE nn Start printing at page nn of the document

—Q Quiet mode. This does not display the page count and messages on the console

—O file Online spooling to the file name. This puts the output formatted with page breaks to the file specified

—DEV device Device selection. This tells MEMOP to use the device specified instead of the default device

—NH No header. Omit the standard header on the output

—NM No margin. Omit left and right margins

—T title Title. Use the quoted string following the —T as the title to be put at the top of the document

—L nn Left. Position the left margin at column nn

—R nn Right. Position the right margin at column nn

—TAB nn Tab. Position tab stops at every nn column

—PORT port Port. Redirect the output to another output port (see above).

RECOVER

The usual way to use recover is to type RECOVER by itself on the CP/M command line. This will check the MEMO.SWP file to see if it is corrupted and if so, it will try to recover any text that has been lost. If it has not been corrupted the program will verify it. In addition, it's possible to give the following command line options.

—CREATE nn m Create a new swap file containing nn pages and divided into m documents. A page is roughly 1000 characters

—ALL All recovers all text in the MEMO.SWP file and places it in documents for your access. Using the —ALL option will recover deleted text and in some cases garbage. The following procedure should be adopted when using the —ALL option: run RECOVER normally, check and save all documents by using the write option, run RECOVER —ALL, extract and save what text you require, run RECOVER —CREATE nn m, read in the document you want to edit.

Commands in MEMO

To edit in MEMO, use the function and cursor keys. In addition, there are other

CTRL @	Repeat command, requires a count and a command
CTRL A	Repeat last command or character
CTRL B	Document object
CTRL C	Close text
CTRL D	Delete object forward
CTRL E	Edge of line object
CTRL F	Set direction forwards
CTRL G	Next document
CTRL H	Move backwards
CTRL I	Tab
CTRL J	Line feed
CTRL K	Previous line
CTRL L	Line information
CTRL M	Carriage return
CTRL N	Sentence object (to next carriage return)
CTRL O	Open text
CTRL P	Position information
CTRL Q	Adjust paragraph
CTRL R	Redisplay screen
CTRL S	Search for string
CTRL T	No command
CTRL U	Undelete
CTRL V	Move up screen
CTRL W	Word object
CTRL X	Main menu
CTRL Y	Delete object backwards
CTRL Z	Abort

Figure 5. Summary of what the keys do in MEMO

keys that have special effects and these are summarised in figure 5. Here I'll deal with a few of the more interesting options.

COPY Will repeat the last command or character typed

CTRL @ Will prompt ESC, enter a number followed by a command or character and it will be repeated the specified number of times

CTRL D or **CTRL Y** Will put you in delete mode. Using the cursor keys will then delete by character, word, line, paragraph or document forward or backward

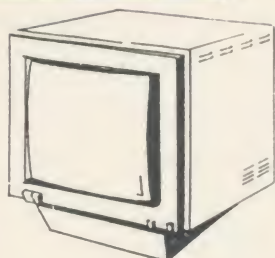
CTRL X Will put you into the main menu. Experiment with this and learn more about *MemoPlan*.

Improving MemoPlan

It's common to want a dedicated word-processing disc which, when you turn on the machine, runs straight away. In Appendix J of the CP/M 2.2 manual it explains how to provide this using a BOOT.COM or BOOT.SUB file.

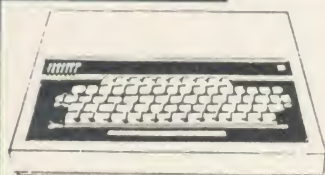
The easiest way of doing this is to type REN BOOT.COM=MEMO.COM. Now, whenever the machine is turned on or CTRL Break is pressed with the disc in drive A, *MemoPlan* will run. However, if you try to print from MEMO, you will get an error saying that the file MEMO.COM is missing. This is because MEMO chains to MEMOP to print and then MEMOP chains back to MEMO to continue editing. To be able to use MEMO as a BOOT.COM file it's

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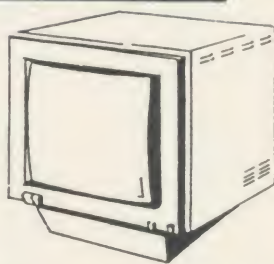
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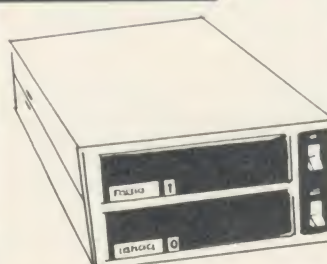
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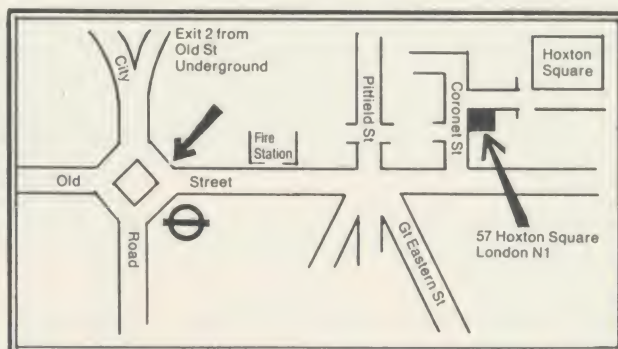


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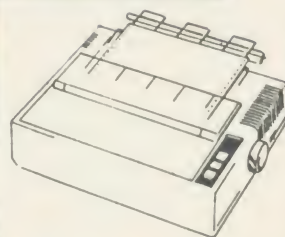
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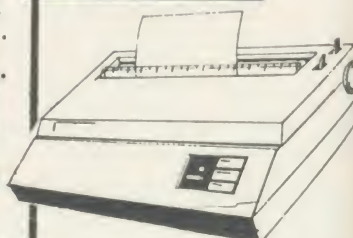


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necessary to patch (alter) the code in MEMO.OVL. This procedure is shown in figure 6.

The program CONFIG.COM supplied with MemoPlan allows you to select a default printer from a set of predefined printers. However, by applying the patches shown in figure 7, CONFIG can be extended. This gives greater control over the way MemoPlan works by allowing you to set the speed at which messages appear, how quickly the text is saved, and even the print area of your printer.

- 1 CONFIG.COM is loaded into memory from 100 to 5700
- 2 List location 8E3 onwards in 8080 assembly code
- 3 Select 8EC onwards to be altered
- 4 Alter JMP 091C (jump command) to three NOP (no operation)
- 5 List again
- 6 Display locations 93A to 952 in hex and ASCII
- 7 Change N to Y to give terminal menu
- 8 Change N to Y to give Default Formatting Parameters menu
- 9 Display again
- 10 Return to CP/M command level
- 11 Save the file (86 decimal is 56 hex, top part of NEXT - PC)

Non-shaded areas are system responses

```
A>B:DDT CONFIG.COM
DDT VERS 2.2
NEXT PC
5700 0100
```

```
-L8E3
08E3 CALL 0DCE
08E6 CALL 1051
08E9 CALL 4AF4
08EC JMP 091C
08EF LXI H,0000
08F2 PUSH H
08F3 LXI H,0953
08F6 PUSH H
08F7 CALL 3DC5
08FA POP D
08FB POP D
```

```
-S8EC
08EC C3 00
08ED 1C 00
08EE 09 00
08EF 21 .
```

```
-L8E3
08E3 CALL 0DCE
08E6 CALL 1051
08E9 CALL 4AF4
08EC NOP
08ED NOP
08EE NOP
08EF LXI H,0000
08F2 PUSH H
08F3 LXI H,0953
08F6 PUSH H
08F7 CALL 3DC5
```

```
-D93A,952
093A 43 75 73 74 6F 6D Custom
0940 20 54 65 72 6D 3A 4E 20 44 6F 63 75 50 6C 61 6E Term:N DocuPlan
0950 3A 4E 00 :N.
```

```
-S946
0946 4E 59
0947 20 .
```

```
-S951
0951 4E 59
0952 00
```

```
-D93A,952
093A 43 75 73 74 6F 6D Custom
0940 20 54 65 72 6D 3A 59 20 44 6F 63 75 50 6C 61 6E Term:Y DocuPlan
0950 3A 59 00 :Y.
```

```
-G0
A>SAVE 86 CONFIG.COM
```

```
A>B:DDT MEMO.OVL
DDT VERS 2.2
NEXT PC
6D00 0100
-D437A,4385
437A 2D 63 68 61 69 6E -chain
4380 20 6D 65 6D 6F 20 memo
-S4381
4381 6D 42
4382 65 4F
4383 6D 4F
4384 6F 54
4385 20
-D437A,4385
437A 2D 63 68 61 69 6E -chain
4380 20 42 4F 4F 54 20 BOOT
-D4396,43A0
4396 63 68 61 69 6E 20 6D 65 6D 6F chain memo
43A0 20
-S439C
439C 6D 42
439D 65 4F
439E 6D 4F
439F 6F 54
43A0 20
-D43C2,43CD
43C2 2D 63 68 61 69 6E 20 6D 65 6D 6F 20 -chain memo
-S43C9
43C9 6D 42
43CA 65 4F
43CB 6D 4F
43CC 6F 54
43CD 20
-D43C2,43CD
43C2 2D 63 68 61 69 6E 20 42 4F 4F 54 20 -chain BOOT
-D43E3,43EE
43E3 2D 63 68 61 69 6E 20 6D 65 6D 6F 00 -chain memo.
-S43EA
43EA 6D 42
43EB 65 4F
43EC 6D 4F
43ED 6F 54
43EE 00
-D43E3,43EE
43E3 2D 63 68 61 69 6E 20 42 4F 4F 54 00 -chain BOOT.
-D4468,4478
4468 2D 63 68 61 69 6E 20 6D -chain m
4470 65 6D 6F 00 2D 6E 68 20 2D emo.-nh -
-S446F
446F 6D 42
4470 65 4F
4471 6D 4F
4472 6F 54
4473 00
-D4468,4478
4468 2D 63 68 61 69 6E 20 42 -chain B
4470 4F 4F 54 00 2D 6E 68 20 2D OOT.-nh -
-G0
A>SAVE 108 MEMO.OVL
A>REN BOOT.COM=MEMO.COM
```

- 1 MEMO.OVL is loaded into memory from 100 to 6D00
- 2 Display locations 437A to 4385 in hex and ASCII
- 3 Select 4381 onwards to be altered
- 4 Alter memo to BOOT
- 5 End alteration
- 6 Display again
- 7 Repeat for the remaining chain commands
- 8 Return to CP/M command level
- 9 Save the file (108 decimal is 6C hex, top part of NEXT - PC)
- 10 Rename the file so that it will auto boot

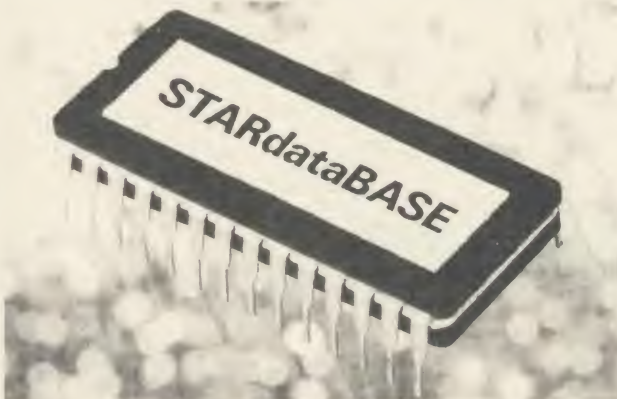
Non-shaded areas are system responses

Figure 6. The procedure to patch the code in MEMO.OVL

Figure 7. Patches to extend CONFIG

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Spreadsheets

revisited

'Quickcalc', Beebugsoft, BBC B, £13 (cassette) or £15 (40/80 track disc)

THE FIRST thing I liked about this package was the stout box it came in. This was quickly followed by the pleasure of finding a disc which operates on both 40 and 80 tracks.

The manual is excellent in content and presentation, although the function key strip is rather amateurish. My main criticism is a familiar one—because it works in mode 7 you can only see a small part of the sheet in memory. The actual input of data is quite logical and easy to remember.

Applying the same tests to *Quickcalc*, as to the spreadsheets reviewed in the February issue (pages 137 to 142) revealed a few minor problems. Because it is limited to 50 rows, my long resource allocation program would not fit, but this would not matter to most users of a home-based system. In any case, the program has the useful capability of increasing the number of rows up to 100, but at the expense of the number of columns.

Some other good features are a very simple numerical grid reference which was sufficient to identify slots (eg, 30, 30 rather than AD, 30) and there is a constant 'bytes free' reminder at the heading to reduce the risk of running out of space.

Another excellent feature is the ability to vary individual column widths between 4 and 36 characters, only otherwise found in *Ultracalc 2*. It is capable of changing from calculation in the usual column order to row order.

Where then does *Quickcalc* fit into the range of spreadsheets? It offers many more facilities than *Vu-Calc* and, since it is about the same price, must be judged the better buy for those with a limited range of needs.

Roger Carus

This information will help you compare Quickcalc with the spreadsheets reviewed in our February issue. Marks are out of 10.

Size of matrix 3	Graphics 1
Labelling 9	Printing 5
Making entries 4	Wordprocessing
Replication 5	Linkages 0
Commercial uses 5	Speed 4
Scientific uses 4	Ease of use 5
Statistical uses 4	Documentation 5
Display 4	Overall value 5

Comments Good cheap sheet for home use. It has 20 columns, 50 rows, a matrix size of 1000 cells with a default cell size of 9 characters. Its window size is 4 columns × 19 rows = 76 cells.

CP/M



CORNER

IN THE February issue Robin Newman presented a method of performing a warm start of BBCBasic in the CP/M environment. This method will work for CP/M with a 1.20 BIOS and a 1.20 Z80 ROM, however it will not work for other versions of BIOS or ROM. A better method is shown in the box.

To understand how this method works it's necessary to explain briefly how the Console Command Processor (CCP) loads and runs a program. When a command is typed to the CCP it first checks to see if it is a built-in command, and if so it is executed.

If it is not then the disc is searched for a file with the command name and a COM extension. If this file is found, the CCP loads it at location 100H onwards. When the file is loaded it calls location 100H and the program starts executing.

When the command WSBASIC is typed, the first 100H bytes of BBCBasic in RAM are overwritten with the patched version. Then control is passed to location 100H which initialises the stack pointer to the area used by BBCBasic and then control passes to the warm boot location. Using this method BBCBasic can be warm booted after a Break or Ctrl Break. Once the file WSBASIC has been created then the Break key can be defined to enter the commands automatically when pressed.

In addition, we can take advantage of the way the CCP runs programs to re-run programs. To do this type SAVE 0 GO.COM in response to the CCP prompt. Now run a program such as STAT. When it is finished type GO and the program will now run again.

STAT shows us another way that we can take advantage of the manner in which the CCP works. You will notice that when STAT finishes running it does not access the disc to perform a warm boot. This is because it does not corrupt the CCP or BDOS, so it uses a RET instruction to return to the CCP rather than the time-consuming warm boot. Any application can do this but care must be taken with the stack, as the CCP allocates a 16 byte stack which can easily overflow. This is the reason for initialising the stack as the first instruction of the BBCBasic warm start.

Edward Brown and Richard Clement launch a new column

Enter BBCBasic and immediately type *CPM or *BYE to return to the A> prompt. Then use the following procedure with the file DDT.COM on the disc in drive B. Shaded areas are system responses.

```
A>SAVE 1 WSBASIC.COM
```

```
A>B:DDT WSBASIC.COM
```

```
DDT VERS 2.2
```

```
NEXT PC
```

```
0200 0100
```

```
-L100,105
```

```
0100 JMP 012A
```

```
0103 JMP 0197
```

```
0106
```

```
-A100
```

```
0100 LXI SP,3A00
```

```
0103
```

```
-G0
```

```
A>SAVE 1 WSBASIC.COM
```

```
A>BBCBASIC
```

Now load a Basic program and list it. Press Break; and when you get an * prompt type CPM and you will return to the A> prompt. Now type WSBASIC. You will return to BBCBasic and a list will show the old program again. The break key can be programmed to enter these commands automatically by using the *KEY command while in BBCBasic. Remember to re-enable the Escape key once in BBCBasic as it is disabled by the Z80 ROM.

If you're a CP/M user with problems, or have hints you'd like to pass on, then write to CP/M Corner, Acorn User, Redwood Publishing, 68 Long Acre, London WC2E 9JH.

Dynamic duos

for businesses

'BuSness Duo Sales & Purchase Ledger Program' and 'BuSness Duo Stock Control & Invoicing Program', Systematics International, BBC, £89 inc VAT each

THESE two new packages come as a welcome development and go a long way towards showing what can be done with elegant procedures designed for the busy businessman.

Each consists of a single standard disc available in a variety of formats.

The *Sales and Purchase Ledger Program* consists of a suite of 11 files running to 67k on two discs, while the *Stock Control and Invoicing Program* has nine programs taking up 39k, again on two discs. Each disc is accompanied by a loose-leaf folder in a strong cardboard box containing the operating instructions, with illustrative examples which are clear and concise.

My main criticism is the limitation on the amount of data which can be handled, and the introductions are very frank about this. The *Sales and Purchase Ledger* will 'cater for 400 customer master records showing account number, name, address, etc, and 750 transaction detail records of receipts, invoices, credit notes, adjustments; and 400 supplier master records showing account number, name, address, etc, and 750 transaction detail records of payments, invoices, credit notes and adjustments.' The *Stock Control and Invoicing Program* can handle 'up to 1000 stock lines; and integrated invoicing.'

It is for the individual to judge whether this is sufficient for his purpose. The number of customers and stock lines permitted should be enough for most purposes, but I should think the scope for transactions might cause problems. It could be sufficient by using short accounting periods or a subdivided system of accounting for different parts of a business, but I suspect that only a business dealing with items of a high unit cost could maintain a whole year's records on one set of files. This makes it fine for a home-based mail order dealer, an estate agent or a functions caterer but not much use for a corner shop.

It is, however, important to realise that this is not a fully integrated package – such as the Acornsoft business suite (reviewed in *Acorn User*, June 1984, pages 103-108 and September 1984, pages 117-118) – that is, the data related to one disc does not transfer to the others in the series. Thus the *Stock Control and Invoicing Program* is quite



A nice suite of programs from Systematics

separate and distinct from the *Sales and Purchase Ledger Program* package, so you cannot sit down and produce a full set of accounts and records from one set of data. In theory this sounds like a serious defect, but after considerable thought I can think of very few examples where it would matter. If a business had a large number of transactions with the same few firms, it would necessitate the transfer of data between the two sets of files which could lead to mistakes.

One basic thing that puzzles me is the absence of provision within the menus of either disc for an identification of drive numbers. The result is that the operator spends an inordinate amount of time changing discs as the prompt instructs.

Taking the *Sales and Purchase Ledger Program* first, let's look at the stages in using the program. With a Booted start you go straight to the Outer Menu which gives a choice of either the Sales Ledger or the Purchase Ledger programs. If you pursue the former through the menu, you arrive at the Master Menu for Sales. This gives a choice of (1) Update/Postings, (2) Reports/Setups, Copy Data Files and Exit. As you are starting, you take (2), only to find a further menu requesting Old or New Files for loading. Having none, you choose 'New' and are prompted to insert a blank formatted disc, which loads – and stops! Always impatient, I began again, and reached for the manual. In fact, there is a wait of almost a minute and then it starts to create six files ready for your data. There is nothing wrong with this, but it would have helped if either the manual or the prompt warned you of the delay.

At this point you begin to personalise the accounts and I must say that I grasped what was going on fairly quickly. There are a few niggles, such as the limited space in each line for company names and addresses. In

fact, I had great difficulty in finding advertisers in *Acorn User* whose names conveniently fitted the 20 spaces without abbreviation. It seems quite difficult to go back and amend entries without producing printouts, checking them and then making compensating adjustments. More annoyingly there seems to be no browse facility to let you look at the Day Book by scanning through the entries. On the other hand, there is an excellent Password requirement which ensures security.

The Sales Ledger program lets you adapt the presentation to your own company, keep regularly updated details of customer accounts, enter transactions, print ledger cards, statements and a variety of reports, and close accounts keeping all debts in age order – and that meets most requirements.

The other programs are comparable and feel rather better, particularly *Purchase Ledger and Stock Control*, although that could be because I came to them later or am more at home with their terminology. I could find no faults in their logic and would have every confidence in using them.

The printing facility works very well with my daisy-wheel printer and quickly produces very acceptable, if basic, statements, stock lists and reports on continuous stationery. There is a facility to use company paper with headings which I did not test but I suspect that setting it up might be awkward. My only complaint about the printing is the large number of dotted lines used which is noisy and slows down production.

In conclusion the *BuSness Duo* is a nice suite of programs which perform well within the limitations of the system. You must, though, look carefully at the nature of your intended use to assess whether it has the capacity to meet your requirements.

Roger Carus



AMX Mouse: children love it

Mouse heading for schools

ONE OF the most versatile and interesting packages to come on to the market recently is the AMX Mouse – a means of communicating with the computer via a small roller unit which sits on the workspace next to the machine (see the review in the April issue). As the mouse is moved, so the cursor will move about the screen, performing various functions according to the icon mode selected.

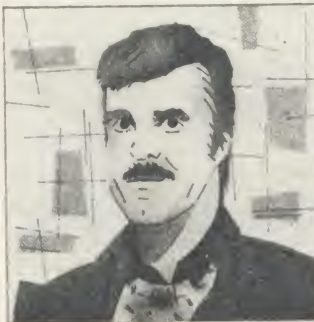
What are icons? They are small pictures – graphical representations of operations that the computer can perform – which are printed around the border of the screen. By moving to the relevant icon and pressing the execute button on the mouse the mode, be it drawing, spray painting, fill, circle drawing or whatever, may be selected. If you have seen the Macintosh in operation you will have witnessed a very similar facility on that machine.

Try to see a mouse in operation if you are interested in the production of graphic materials for use in the classroom, or indeed for use by the children who take to it with great enthusiasm and alacrity. You will not be disappointed!

First readers

A SERIES of first readers in computing entitled 'Data Log' has just been published by Collins. There are books with questions to be answered, pictures to be drawn and programs to be written into the space provided. They are priced at £2.95 and deal with a wide range of computers including the BBC micro.

Commentary by
Nick Evans,
who welcomes
reader feedback



Choosing the right Logo for your classroom

LOGO USERS are now having difficulty in choosing which version to use in their classrooms because of the number of products available.

How to choose is always a problem and the usual rule holds true in this case – see it before you buy, if possible.

The main factors involved in deciding on which Logo version to buy are related to ease

December 1984 issue of *Acorn User* fulfils many of these objectives and represents a comprehensive and well-structured version of Papert's original vision.

Others are available however – notably Logotron, which is marketed through Tecmedia (see page 65). This has, much to Acornsoft's chagrin, proved to be a much faster implementation of the language with benchmark tests showing vast advantages in speed over the Acornsoft version. Added to this there is a sprite board now available for Logotron which enables children to program machine-code style 'action-graphics'. A further advantage for those who use their micro for many purposes is that Logotron comes on a single 16k chip whereas the Acornsoft implementation comes on two chips, which either means the use of an expansion board or no wordprocessor, *Disc Doctor* etc.

But don't despair if you have already purchased your Acornsoft version. Logotron and Acornsoft are at the moment the leaders in the field and each has its own advantages. The lack of speed in the Acornsoft Logo is well compensated for by the range of extensions with abilities to 'hatch' up to 32 multiple turtles, drive printers of different types, interface with a variety of floor turtles and communicate with other external peripherals. The breadth of primitives is also remarkable – well over 200 of them. Doubtless the battle will develop between these two companies with software spin-offs from both sides to entice or placate the users.

● See Joe Telford's comparison of four Logos on page 65.



of use, flexibility and speed. In terms of the language itself an indication of how wide-ranging the package is can be seen by the number of 'primitives' (standard commands) that are available to the user. Also the editing facilities should be easy to use and clear. The speed of operation should enable the user to create complex programs which will still run smoothly and at an acceptable pace.

List processing should be available so that advanced programming may be undertaken and there should be room for the user to grow and not be limited by the facilities.

The Acornsoft Logo reviewed in this and the

Acorn to set up schools hotline

AS THE national leader in the supply of computers to schools, Acorn is following up its 'Micros in Schools' scheme with more support to the many Acorn users in education.

A Suppliers' Forum has been set up 'where educationists can present their needs – new types of equipment, new software etc – to the industry as a whole, all working together to help make schools make the best use of their resources'.

An Educational Hotline is also to be created which will supply information and help about projects and problems within the education field. And finally, attractive price deals are to be set up for 'financially hard-pressed schools' to equip themselves more speedily.

One just hopes that the recent changes at Acorn will have no effect upon these proposals since they will be welcomed by schools and colleges (most of which generally consider themselves to be 'financially hard-pressed' these days) if they come to fruition.

Network system from Richmead

A NETWORK system which interfaces up to 16 BBC micros to a single RML 380Z is available from Richmead Micro.

Many schools started micro-computing with the 380Z which then became redundant with the advent of the Beeb. However, when a proposal is made for a network within a school, this leads to the expense of another micro to act as the main terminal for disc and printer access.

If the 380Z is available, then, at £275 plus £20 per BBC station, this network offers considerable financial advantages over the other options currently on offer. Disc access is slower than normal but is much quicker than tape and the system is totally compatible with popular BBC micro programs such as *Wordwise* and *View*.

Contact Richmead Micro, 29 Easby Way, Lower Earley, Reading RG6 3XA, tel: (0734) 665771.



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NEW RELEASES

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This powerful port control module connects to the user port of your BBC Micro and can form the basis of a computer control system for use in the home or in schools.

- User port still available
- 2 Mains outputs, rated at 2.5A, 625W, optically isolated and zero voltage switched.
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- 2 DC outputs can be used for rapid switching, rated at 5A, 50V, 50W max.
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- Mains powered, regulated 5 and 12V supplies available to the user.
- Many input and output modules available. Further modules soon to be released.
- Demonstration software including a teaching program supplied on cassette or disc. All connecting leads and user manual supplied.

PortCom in rigid plastic case £126.50
PortCom in metal case £143.75

REAL TIME CLOCK

This product can form the basis of calendar type programs, desk diaries etc. Useful in control situations. The clock has its own battery back up and never forgets the time. Connects to the user port. Supplied with user manual and software demonstrating its use.

Real time clock £36.80

BBC - ZX PRINTER INTERFACE

Still available, this popular product allows a ZX Printer to be used by the BBC Micro for listings, program development etc. Complete with user manual and fully relocatable machine code printer driver software.

BBC - ZX Printer Interface £29.95

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An almost infinite vocabulary can be produced by simple software. The unit contains its own amplifier, loudspeaker and volume control. Connects to the user port. Supplied with user manual and demonstration software.

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Welcome

MACH1

MACHINE CODE MADE EASY! Assembler/disassembler as reviewed in Acorn User, March 1985. Features include unique single-pass symbolic assembler which already recognizes all the system variables like OSBYTE etc., has many additional pseudo-operands and comprehensive single stepping routines for debugging programs. Features unrivalled facilities for the COMPLETE disassembly of programs into editable source code (VIEW compatible) which can be saved to disc for incorporation into other programs. Powerful automatic disassembly mode takes much of the hard work out of disassembly. Second processor (2P) compatibility for examining all ROMs and memory both sides of the tube. Allows development of 8 and 16K ROMs with code and source code all in RAM at once. Available in 16K EPROM for £39.95 or on disc only for sideways RAM and 2P users for only £19.95. A utility disc, manual and a HI version for 2P use are included.

Please state whether 40 or 80 track discs required. Further details supplied on request.

DAP2

FLEXIBLE DATA ANALYSIS PACKAGE. Particularly suitable for educational, scientific or laboratory use. Suite of three programs for the analysis and display of experimental data, sketching of mathematical functions and curve fitting with power law and polynomial functions. Input data files have a simple structure and are easily generated from your own programs allowing DAP2 to be interfaced easily to other programs. Can handle 9 sets of data and 1024 datapoints at one time. Includes DATA EDITOR for editing, scaling and transforming data and an ARCHIVE facility to file numerous data sets under one filename. Fully annotated graphs, histograms etc. can be dumped to EPSON compatible printers from Mode 0 display. DAP2 is supplied on disc for £25. DAP3 is a version making full use of the 6502 2nd Processor capabilities at £30 and DAP1 is a tape-based program at only £14.

GNOMONICA

2 STABLE COTTAGES, PLEYSTOWE, RUSPER ROAD, CAPEL, DORKING, SURREY RH5 5HE

New applications for the Beeb please Acorn

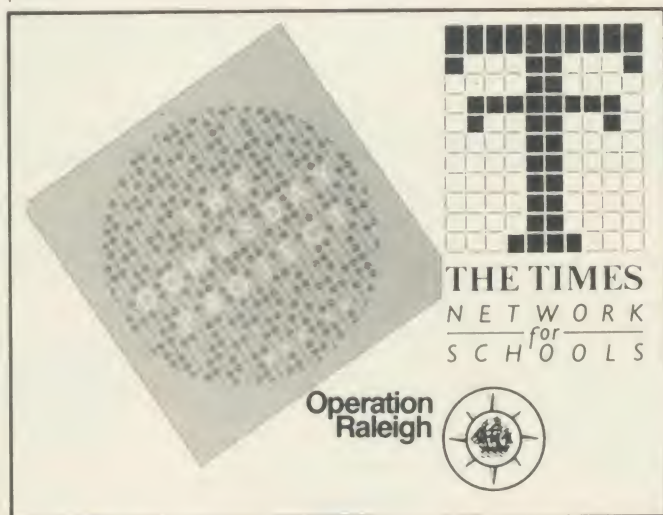
ACORN is naturally delighted by the number of 'adventurous applications' the BBC micro has been put to – the new Domesday Book, Telesoftware, Operation Raleigh (which is using a lab of Bees to monitor the progress of the expedition), as well as experiments in satellite communications and a proposed environmental database in partnership with the World Wildlife Fund.

Another major venture that is nearer home for most of the readers of this column is The Times Network for Schools (TTNS), which is based on the Telecom Gold system of communication provided by British Telecom. Normally quite expensive, although very flexible, this makes the Gold system available for schools to use at a fraction of the normal price.

A comprehensive database is being created about curricular and extra-curricular subjects, and careers advice is on offer as well. Inter-school communications are also available, allowing the exchange of information between groups and for administrative purposes in the school.

There is a once-only charge of £125, then it costs £69 per term per mailbox, which is a huge discount on normal rates. Included in this price comes all the hardware and software necessary, as well as a Tutor program and operating manual.

Education authorities are taking the initiative on these offers and schools should contact their micro-electronics advisers or the education offices direct to find how the scheme is administered in their area.



Toad leaps to the aid of Wordwise users

HAVE YOU ever been frustrated by the 'Disc full' message when using *Wordwise* and *Edword*, knowing there's still loads of room left? The user is limited by the Beeb's filing system, which allows only 32 files per disc, but Toad Educational Computing has come up with the *Wordwise* Menu Disc, which allows up to 52 files and provides a catalogue of the files on screen with a description of the contents of

each. No more file searching because you can't remember what was in 'GVN3/12'!

Toad also supplies a timetable administrator package and school database. Toad Educational Computing, 8 Westbourne Grove, Sale M33 1RP, tel: 061-969 4740 (Prestel as phone number without the first 0).

84 66 79 78 84 66 84 73 84?



Computalab: already installed in four schools

Look out for ready-made computer classrooms

FOR SCHOOLS with the money and the will to get ahead of the field, it may be worthwhile investigating the purpose-designed Computalab. This facility offers 12 workstations and a teaching station – all Bees – linked together by Econet.

The teaching station includes a file-server, dual disc drive and an ink-jet printer, plus two large overhead monitors to give clear visibility for demonstration work. All of this is housed in a prefabricated building of attractive design which requires only basic ground preparation.

Naturally, the price is high but the compensations are

great. How many schools have their computers ill-organised in ordinary classrooms with workspace cobbled together by the staff on a makeshift basis? The problems of wandering leads and extensions and the vagaries of the power supply running from dubious extensions all pose not only difficulties but also dangers within the computer room.

This is the ideal solution – already being used in four schools and probably more by the time of going to press. If your school or LEA is interested contact Elliot-Medway Ltd, FREEPOST, Glebe Court, Peterborough PE2 8BR, tel: (0733) 52151.

Schemes at your service

MAINTENANCE can be a nightmare in schools or colleges with many micros. Servicing is expensive and so is consequently often undertaken by staff, who are already hard-pressed for time. Now several servicing schemes have come into existence and I'll document three of them here.

Cumana, the suppliers of many of the disc drives used in schools, has opened a servicing branch in Daventry. This deals not only with drives but also with computers and all associated peripherals. As an example of prices the minimum charge for a BBC B is £18 and £16 for dot matrix printers. Bear in mind this is simply a repair service and not a servicing scheme.

Simnett Computers offers a similar service with comparable prices.

The Micro Repair Club

offers an insurance scheme whereby, for an annual premium, the poorly micro will be repaired free of charge. One year's membership is £24.95, with a renewal charge of £14.95 per year after that. Schools must pay the full charge for the first four micros but thereafter will pay £19.95 per micro. The only additional cost is the price of postage to the repair centre. If premiums are paid for two or more years in advance there is an additional discount.

Full details are available from: Cumana, Daimler Close, Daventry NN11 5QJ, tel: (03272) 79494. Simnett Computers, Unit 14, St George's Industrial Estate, Kingston KT2 5BQ, tel: (01) 541 1495. Micro Repair Club, Swan Court, Mansel Road, Wimbledon SW19 4AA, tel: (0990) 28102.

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11 Na	12 Mg
19 K	20 Ca



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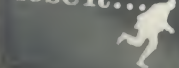
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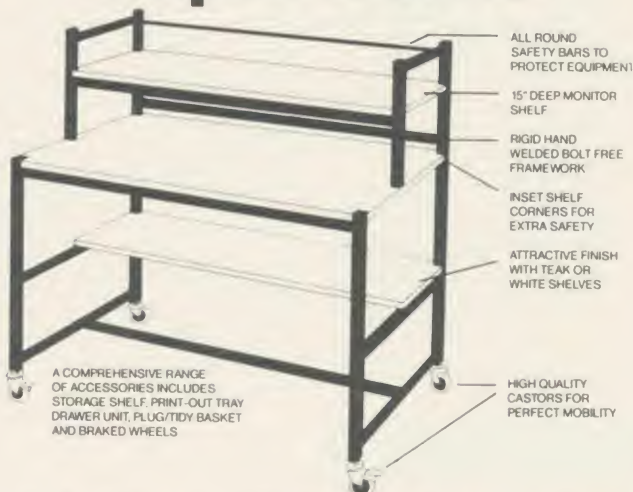


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TRADE, ENQUIRE ABOUT HOT LINE

AS SEEN ON TV

SOFTWARE GUIDE

Our list, compiled by Nick Evans, will help you track down the educational software you're looking for. Turn to page 153 for the publishers' addresses.

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TITLE	PUBLISHER	PRICE	MACHINE	COMMENT	KEY	TITLE	PUBLISHER	PRICE	MACHINE	COMMENT	KEY
1914	Camb Micro Soft	£15	BBC B	Sec,	h,s	BelBase	BelTech	£18	BBC B	Jun/Sec,	dd
3D Transformation	Muse	£10	BBC A	Sec,	gg	Bell	Muse	£5.50	BBC B	Jun/Sec,	p,s
Accidents Datafile	RoSPA	£5	BBC B	Factfile,	u	BelPlot	BelTech	£9.50	BBC B	Sec,	m
Accounts	Heinemann	£14	BBC B	Sec,	d	Bestfit	Greenwood	£5	BBC B	Sec,	m,p
Acoustics	Longman	£14	BBC B	Sec,	p	Beyond Basic	BBC	£11.50	BBC A	Sec,	i
Action Science	Franklin Watts	£11	BBC B	Jun/Sec,	i,p	Blo Wood	Solent	£9	BBC B	Jun/Sec,	b,s
Action of the Heart	Garland	£11	BBC B	Sec,	b,s	Biology	Longman	£20	BBC B	Sec,	b
Additional Fun	Shiva	£14.95	BBC A	Inf/Jun,	a	Biology	Nelcal	£23.50	BBC B	Sec,	b
Advanced						Biology	Tom Shipman	£7.99	BBC B	Sec,	b
Programming	Addison-Wesley	£10.30	BBC B	Sec,	i	Biology Revision	Abacus	£12.95	BBC B	Sec,	b
Adventure Story	ESM	£11	BBC B	Jun,	e	Blomass	Longman	£14.50	BBC B	Sec,	b
Adventure Storywrite	ESM	£7.95	BBC B	Inf,	e	Bioscience	IRL Press	£19.95	BBC B	Sec,	b
Airport	Gibsoft	£6.75	BBC B	Sec,	dd,cc	Blockbuster	Argus Press	£8.95	BBC B	Inf,	x,
Algebra 'O'	Ampalsoft	£5.13	BBC B	Sec,	m	Blood Circulation	Garland	£11	BBC B	Sec,	b,s
Algebra Progs	Acornsoft	£9.95	BBC A	Sec,	m	Blood Sugar	Longman	£14.50	BBC B	Sec,	b
All Fingers Go	NEC	£14.95	BBC A	Jun,	t	Body Processes and					
Alphabet	Opalsoft	£9.95	BBC B	Inf,	v	The Fate of Protein	Garland	£10	BBC B	Sec	b
Alphachopper	Sulis	£9.95	BBC B	Inf,	v	Brain teasers	LCL	£5.95	BBC B	Jun/Sec,	q
Aluminium Plant	Longman	£14.50	BBC B	Sec,	s	Break-in	Highlight	£7.95	BBC B/ Electron	Inf/Jun,	v
Amplification	Mega Sci Cal	£12	BBC/ Electron	Sec		Bridges	Fernleaf	£9.95	BBC B	Jun	a
Anagram	Edsoco	£4.95	BBC A	Inf/Jun,	e	Britain	Datapen	£5.95	BBC B	Sec,	g,q
Angle	Chalksoft	£11.25	BBC A	Jun/Sec,	m	British Cities	Schoolsoft	£8	BBC B	Jun/Sec,	g,q
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Answer Back (Sen)	Kosmos	£10.95	BBC B/ Electron	Sec,	q	Call Your Bluff	Square	£7	BBC B	Jun/Sec,	e,q
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Author	ESM	£30	BBC B	Jun/Sec,	jj	Census Analysis	Longman	£37.50	BBC B	Sec,	u
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(Barcodes)	Alpha Computer	£25	BBC B	Jun/Sec,	i	Chords	Aztec	£6.50	BBC B	Jun/Sec,	m
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						Circuits-diodes	Garland	£11	BBC B	Sec,	p,s
						Circuits-switches	Garland	£11	BBC B	Sec,	p,s

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Climate	Heinemann	£12.50	BBC B	Sec,	g,cc		Electron				
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Clogo	Addison-Wesley	£29.95	BBC B	Jun/Sec,	o		Electron				
Clown	Englefield	£6.25	BBC B	Jun,	e,v	Dnumb	MUSE	£8	BBC B	Inf/Jun,	a
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Co-ordinates and lines	Garland	£7	BBC B	Jun,	m	Early Learning	BBC	£10	BBC A	Inf,	m,e
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Colour Matching	SESS	£10.35	BBC B	Inf,	x,gg	Earlynum	Bryants	£5.10	BBC B	Inf/Jun,	a
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Computer						Election Programme	Social Science	£39.50	BBC B	Sec,	d
Programme	BBC Soft	£10	BBC B	Sec,	i		Disc				
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			Electron				Electron				
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Crossed Words	Aztec	£6.50	BBC B	Inf/Jun,	e	Factors and Fractions	Ed Soft	£5.95	BBC B	Jun,	a
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			Electron			Farmer	Longman	£14.50	BBC B	Sec,	d,s
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Current Electricity	Mega Sci Cal	£9.95	BBC/	Sec,		Find the Lady	Fernleaf	£9.95	BBC B	Jun/Sec	
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Das Schloss	Chalksoft	£9.25	BBC A	Sec,	l,q		Electron				
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Dataquiz	Bryants	£4.85	BBC B	Jun/Sec,	q	Mistermen	Mirrorsoft	£8.95	BBC B/	Inf,	v
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Digital Logic							Longman	£14.50	BBC B	Sec,	b,s
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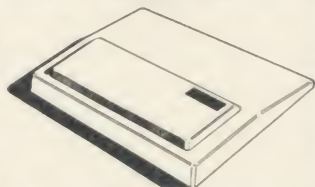
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Followme	Edsoco	£5.95	BBC A	Jun,	q	Henry IV part 1	Penguin	£7.95	BBC/ Electron	Sec,	
Food	Heinemann	£33	BBC B	Jun,		Here & There with Mr Men	Mirrorsoft	7.95	BBC/ Electron	Inf,	
Forensic	AVC	£3	BBC B	Sec,	c	Heredity	Longman	£14.50	BBC B	Sec,	b
Formulae Game	Longman	£14.50	BBC B	Sec,	c	Hide and Seek	ASK	£8.65	BBC B/ Electron	Jun,	v,w
Forth	Acornsoft	£16.85	BBC B/ Electron	Jun/Sec,	i	Highway Code	Bryants	£5.10	BBC B	Jun/Sec,	f
Four in a Row	Dial	£6.50	BBC B	Jun,		Highway Code	Tectel	£1.95	BBC B	Jun,	f
Frac	Tecmedia	£11.95	BBC B	Sec,	a	Highwire	Englefield	£6.25	BBC B	Jun,	m
Frac Attack	Shards	£6.95	BBC B	Jun/Sec,	a	Hill and Doon	MUSE	£6	BBC B	Sec,	a,n
Frac!	MUSE	£8	BBC B	Jun/Sec,	a	Hills	Longman	£14.50	BBC B	Sec,	g
Fraction Chase	GED	£4	BBC B	Jun,	a	Hisdata	Scorby	£9	BBC B	Jun/Sec,	dd,h
Fractions	Garland	£7	BBC B/ Electron	Jun,	a	History Quiz	Acornsoft	£12.65	BBC B	Sec,	h
Fractions	Heinemann	£9.50	BBC B	Jun,	a	History Revision	Abacus	£12.95	BBC B	Sec,	h
French	Acornsoft	£11.05	BBC B	Sec,	i	Homes	Heinemann	£33	BBC B	Jun,	
French	AVC	£3	BBC B	Jun,	i	Homogenous					
French	Micro-aid	£7.95	BBC B	Sec,	i	Equilibrium	Longman	£14.50	BBC B	Sec,	c
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GB Geography	Primasoft	£6.95	BBC B	Jun/Sec,	g	Identify Europe	Kosmos	£7.95	BBC/ Electron	Jun,	
GB Ltd	Simon Hessel	£5.13	BBC B	Sec,	d	images	Miga Sci Cal	£9.95	BBC/ Electron	Sec,	
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Gases	Garland	£11	BBC B	Sec,	c	Into the Unknown	Tressell	£9.50	BBC B	Sec,	
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Guided Discovery	Etna Software	£10.75	BBC B	Jun,	i,ee	Psi-Q	Mirrorsoft	£9.95	BBC/ Electron	Sec,	
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Happy Numbers	Bourne	£8.95	BBC B/ Electron	Inf,	x	Kopfjager	Cambridge Micro Software	£15	BBC B	Sec,	i
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Harlequin	LTS	£14.95	BBC B	Jun/Sec,	gg	La Princesse	Aztec	£6.50	BBC B	Jun/Sec,	i
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Heating Costs	BBC	£10	BBC B	Sec,	d	Language Development	LTS	£9.50	BBC B	Jun/Sec,	e

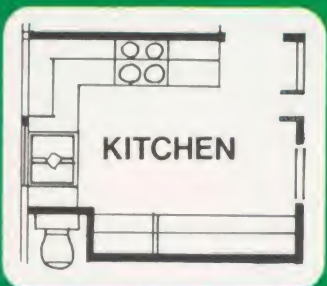
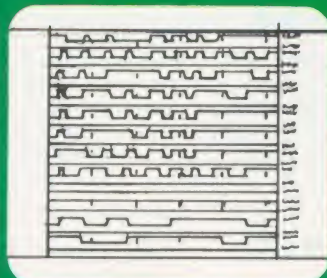
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Learn About Words	Dorling Kindersley	£9.95	BBC B	Inf/Jun,	v
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Lift	Cambridge Micro Software	£15	BBC B	Sec,	
	Complete	£12.95	BBC B	Jun/Sec,	e
Lingo	Garland	£11	BBC B	Jun/Sec,	u
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Lisp	Garland	£10	BBC B	Sec	ii
Littoral Zonation					
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Mr T Tells Time	Ebury	£12.95	BBC B	Inf/Jun	x
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Number Painter	ASK	£9.95	BBC B/	Inf/Jun,	a,n
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Altra Probe is available in two versions. PROBE 1 and PROBE 2

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Basic Ed, is on 8K ROM which contains 21 additional commands. They are: \$ search, List matches, Number matches, Global replace, Selective replace, Bad programme relink, Copy lines from one part of a programme to another, Format a listing, Move, Super pack, Renumber, Table line references, Unpack, Variables X ref, List entire programme, Keyboard immediate mode, Printer on/off, Paged mode on/off, List match lines, Concatenate, Strips rems, spaces etc. Altra Basic Ed. is an essential helpful tool for the Basic / Assembler programmer. Altra Basic Ed. is available in two versions. Basic Ed. 1 and Basic Ed. 2.

ALTRA BASIC ED. 2 IS TUBE COMPATIBLE FIRST AID 1.1

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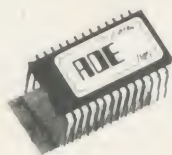
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			Electron			Reading Music					
Perspective	Aztec	£6.50	BBC B	Sec,	gg	Grade 1	Ardsoft	£31	BBC B	Jun/Sec,	k
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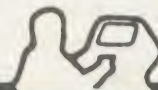
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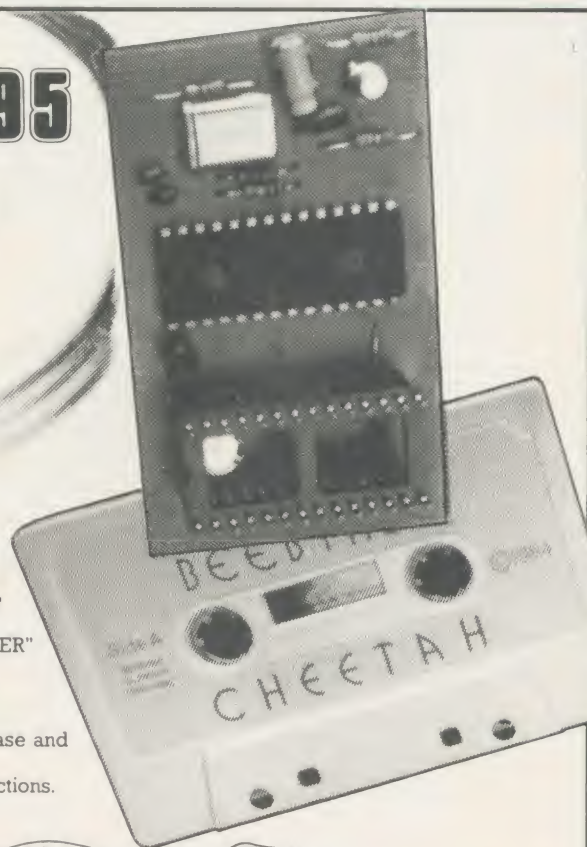
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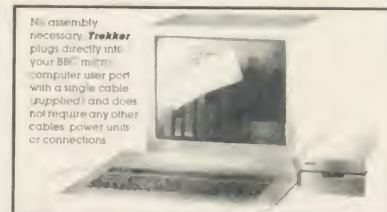
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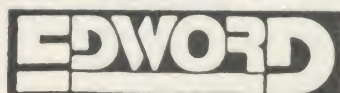


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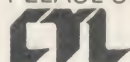
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COIC Software Manpower Services Commission, Moorfoot, Sheffield S14PQ, tel: (0742) 704563

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Computercat 224 Chapel Street, Leigh, Lancs

Comsoft 7 Roman Drive, Leeds LS8 2DR

Ian Copestake 23 Connaught Crescent, Brookwood, Woking, Surrey, tel: (0486) 74755

Corona 73 High Road, South Woodford, London

Creative Sparks Thomson House, 296 Farnborough Road, Farnborough, Hants GU14 7NU, tel: (0252) 543333

CUP—Cambridge University Press Edinburgh Building, Shaftesbury Road, Cambridge, tel: (0223) 312393

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Daco 59 Mackenzie Road, Moseley, Birmingham, tel: 021-449 2253

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A NEW BREED OF KEYBOARDS

Has the qwerty keyboard had its day? Chris Drage

154 outlines some of the alternatives on the scene

THE FACT that just about every micro sold has a qwerty or type-writer keyboard is really something of a historical accident. In the days of mechanical typewriters this rather illogical arrangement of keys was necessary to separate the most frequently used keys which, if placed together, tended to jam the mechanism, and this layout has persisted.

With computers finding a niche in both primary schools and the home the question arises: should we present young children with so many bizarre symbols and expect them to cope?

However, there is an increasing number of alternative keyboards available for the BBC micro, and so it's worth having a look at what three of them offer.

The Concept Keyboard from Star Microterminals, the Presfax 100 Keypad from Schofield and Sims and the Touchmaster from Touchmaster have one thing in common—they present the user with an array of touch-sensitive pads which may be programmed according to his or her

needs. This feature opens the way to a vast range of applications. Each keypad uses overlays which are individual to a program. Thus, only the inputs essential to each piece of software are presented, in a form appropriate to the experience or ability of the user. In addition, overlays are not restricted to a two-dimensional format—elaborate 3D ones can be constructed involving, for example, a model farm, a park or a supermarket, and actual models can then be moved over the board. The variety of arrangements is endless. Once the unnecessary features of the normal keyboard are removed, life certainly becomes easier for the child.

Concept Keyboard

The Concept Keyboard has been available in its familiar A4 size for over a year now and, at the time of writing, A3/128 and A3/256 boards are available. A2/128 and A2/256 boards are to be launched soon. Each is constructed from a wipe-clean, scratch- and chemical-resistant polycarbonate surface,

mounted in an aluminium case. The keyboard is linked to the Beeb via a 1100mm ribbon cable to the user port. In addition to the 128 or 256 pads there are a number of larger, specialised pads at the top of the board. These comprise a user pad, a repeat pad, a 'bleep' on/off pad and a shift pad (the latter on 128 boards only). Of these, the shift pad is probably the most significant as it allows the 128 cell models to produce 256 different signals. The bleep key provides a soft note to confirm the press of a keypad.

The 128 board has its 128 touch sensitive areas arranged in a 16 × 8 matrix while the 256 board uses a 16 × 16 array. Any key or group of keys can be assigned by the user to any character, word, numeral, shape, etc. The documentation describes routines and procedures to build into your programs to enable the Concept Keyboard to communicate with the computer. Anyone with some programming experience would find this a straightforward exercise. Remember, the program must have space and be listable.

PRODUCTS AND PRICES

	Concept Keyboard	Presfax 100 Keypad	Touchmaster
Dimensions	A4 Board 227 × 315 × 25.4mm (overlay 210 × 297mm) A3 Board 315 × 435 × 25.4mm (overlay 297 × 420mm)	360 × 360 × 3mm	350 × 330 × 30mm (Overlay 210 × 297mm)
Cable length	1100mm (user port)	1000mm (analogue port)	1500mm (RS423 port)
Peripherals		Perspex 100 square overlay + pegs (£9.50 + VAT)	
Price	A4/128: £90 + VAT A3/128: £114 + VAT A3/256: £156 + VAT	£79.50 + VAT	£149.99 inc VAT plus £4.99 inc VAT for BBC micro interface
Software supplied	Starset (disc)	Introductory user pack £5.50 + VAT (cassette) £8.50 + VAT (disc)	Multipaint (cassette)
Review copy obtained from	Star Microterminals, 22 Hyde Street, Winchester, Hants SO23 7DR	Schofield & Sims, Dogley Mill, Fenay Bridge, Huddersfield HD8 0NQ	Touchmaster, PO Box 3, Port Talbot, West Glamorgan SA13 1WH

I received a draft of the new manual, and its author has made this extremely detailed document readable and understandable to the inexperienced user.

I suspect many teachers will want to adapt existing programs for use with this keyboard. Star Microterminals are well aware that few teachers have the time or inclination to write their own software adaptations, so they have thoughtfully provided an excellent software package called *Starset* to take the hard work out of this.

All that you have to do is draw up the actual overlay (see picture). I found a piece of stout tracing paper is the only aid necessary.

The Concept Keyboard is a well designed and manufactured unit. Features like the keyboard's strength of construction, its reliability and its sensitive response over the entire matrix area all add up to what can only be described as an excellent product and a most valuable addition to a school's computer resources. With an increasing number of software houses now providing Concept Keyboard software, I unhesitatingly recommend this unit for primary and special schools.

The Prefax 100 Keypad has 100 touch-sensitive squares arranged in a 10×10 matrix. It measures $360 \times 360 \times 3$ mm and, although this sounds rather on the thin and flimsy side, its 5-ply fibre base proved to be both strong and flexible.

Included in the package are the keypad, a handbook and a connecting lead. An introductory software pack (including four overlay sheets with locating pegs) is available on cassette at £5.50 or disc at £8.50. Included in the review sample was a clear perspex peg board with locating pegs and wooden counting pegs; this is available at an additional cost of £9.50.

Prefax 100

The Prefax 100 is connected via a 1000mm, 6-way ribbon cable to the analogue port on the BBC micro. Assembling and connecting up the system proved to be a very quick and easy process. Before the Prefax 100 can be used, however, it must be calibrated because each keypad generates slightly different signals. A program called *Calibrate* takes the grind out of this operation and in turn produces a file which may then be transferred to any disc containing Prefax software, the idea being to boot this program up from disc at the start of each session. For cassette users this is a rather tiresome task as it all takes valuable time. Once the driver file is in place you are ready to start.

A substantial software package is



Home-made overlays make the Concept Keyboard a versatile tool



The Junior Counting Board package in action on the Prefax 100

available at an additional cost. It comprises *Actfax*, *Facefax*, *Sketchfax*, *Askfax* (on disc version only), *Getfax* (on disc version only), *Preskel* and *Junior Counting Board*.

For me the star of this package is the *Junior Counting Board*. This suite of seven programs enables children to explore number relationships through the medium of a 100-square peg board. The programs vary in difficulty from simple counting games to activities involving multiples and the discovery of prime numbers. As my class of 10-year-olds had just embarked on a study of factors, products and multiples I thought this would be an excellent opportunity to introduce the less able of them to the *Junior Counting Board*. Using the perspex overlay and the coloured wooden pegs, it took even the weakest child no time at all to arrive at

the prime numbers using the Sieve Of Eratosthenes method. Much discussion took place concerning the patterns created by the multiples of various numbers, and the activity provided an excellent springboard for further work. I do, however, have a criticism of the level of the language in the programs, much of which is unnecessary anyway. I would have preferred to see an on-screen 100-square confirming the squares in use and a provision for teaching routines to help the child.

The 20-page handbook is well written and describes both setting up the Prefax 100 and the software in some detail. There is a useful section describing how to adapt the user's own programs with the help of the *Preskel* program.

Undoubtedly, the Prefax 100 will find a place in primary schools, and I'm certain Schofield and Sims will ensure

HOW THEY SCORE

Touch Pad:	Concept Keyboard	Presfax 100	Touchmaster
Design	4	3	3
Construction	5	4	3
Strong enough for use in	schools, industry, laboratory	schools, home	home
Cable length	4	4	5
Handling characteristics	5	3	3
Ease of use	5	4	2
Software provided	4	4	3
Documentation	5	4	3
Range of applications	wide	education	entertainment
Value for money	4	4	2
KEY 5 excellent, 4 good, 3 satisfactory, 2 poor, 1 very bad.			

that software support is not thin on the ground. The first generation software provided with the keypad has promise of better things to come.

Touchmaster

The Touchmaster pad comprises a grey plastic case measuring 350 × 330 × 30mm with an A4 size, black plastic touch-sensitive membrane in the centre. Also included in the package are a mains transformer, connecting lead, graphics stylus, user guide and an applications program called *Multipaint* plus an overlay.

The Touchmaster has both parallel and serial ports for connection to various micros. The Beeb version uses the BBC micro's RS423 port (data transfer is at 9600 baud). Power is obtained from a remote 6v PSU. A power indicator LED is provided to remind the user that the unit is ready for use. There is no grid of touch-sensitive pads, but instead the whole 210 × 297mm area is pressure sensitive, giving 256 × 256 resolution and a total of 65,500 individual co-ordinates. In this configuration the Touchmaster seems to lend itself to graphics applications. Without having any other software provided for review, it was difficult to ascertain how areas may be defined for the multiple 'key' input necessary for young children.

The 11-page user guide is a model of brevity, and useful information is conspicuous by its absence. An eight-line Basic program is listed and this is supposed to demonstrate how the Touchmaster works with the computer. It enables the computer to read co-ordinates from the Touchmaster, scale and display them on the screen. No information or help is offered on how to adapt the user's programs to work with



Touchmaster: limited applications

KEYPAD HINTS

Here are some tips for readers considering buying a touch-sensitive keypad.

- Where possible cover all overlays in clear plastic laminate. You then only need to wipe the overlay with a damp cloth to remove grubby finger marks.

- Don't use sellotape to fix the overlay to the keypad. A bit of Blotak in each corner does a far better job.

- If you have an A4 Concept Keyboard and are thinking of purchasing an A3 model you may wish to convert your existing overlays to use with the larger model. Enlarging on a photocopier does not produce a correct A3 overlay. The only way to achieve this satisfactorily is to trace the A3 keypad and mark those pads which correspond to the A4 overlay. The tracing can then be transferred to a new (blank) overlay. Star Microterminals provides special transfer sheets for this purpose.

- As a safety precaution for the host micro, don't clip the connector to the Concept Keyboard socket. Should the keyboard be knocked to the floor (as happens in a busy classroom), then the plug simply pops out. The alternative can result in the micro also being pulled and possibly damaged.

the Touchmaster. No doubt experienced programmers could cope, but beginners are left high and dry.

The *Multipaint* program is included to demonstrate the Touchmaster's capabilities. It is a graphics package which enables simple pictures and designs to be created with the help of a plastic stylus. The overlay provides a menu from which a range of options may be chosen. This method of creating graphics is almost identical to that using a light pen, the only difference being that the Touchmaster replaces the screen. As my class are accustomed to using light pens in this way I decided to let them do the reviewing of this program.

All the expected features are included in *Multipaint* – free-hand drawing, lines, simple regular polygons, circles and points. Line-drawing is provided with a 'rubber-band' line to aid accurate fixing. In addition, there are five brush types and nine brush widths which, used in combination, provide some attractive effects. 'Blobs' and 'free dots' also give rise to some interesting patterns. The fill routine is extremely fast. Screens may be saved and loaded with specified filenames. Not unexpectedly, the program uses mode 2 with its full complement of 16 colours.

However, as is often the case with first generation software of this type, here are a number of small bugs and not a few shortcomings. At times it is necessary for the children to exert a good deal of pressure to elicit a response from the Touchmaster. Several facilities are sadly missing from this package – erasure of an error immediately after its execution, and the ability to input text on the picture are essential elements in a serious graphics program. Also, there is no option to dump a screen to a printer. Overall, *Multipaint* is rather disappointing and does not live up to the claim that it has 'many serious applications'.

With the software presently available, it's difficult to see how the Touchmaster could be used in a productive way. At £150 it appears overpriced and limited compared with the other keypads reviewed. Perhaps when more software appears on the scene the range of applications may increase and make it a more viable proposition. However, I am still not convinced that the Touchmaster represents value for money.

At the moment the software support for the Presfax 100 and Touchmaster is thin on the ground but there are some very good educational software packages available for the Concept Keyboard. I'll look at some of this software in the next issue.

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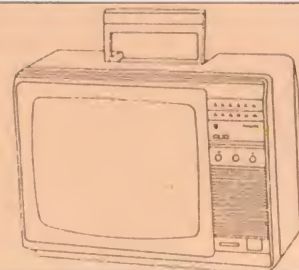
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French mustard	75	ml	2.5 tbsp
Nutmeg			
Raspberries	600	g	1.5 lb
Single cream	90	ml	4 tbsp
Whipping cream	375	ml	0.75 pt

Change the line? Y/N

'Comp-u-cater', Shumwari Associates, 12 Marlin Court, Marlow SL7 2AJ, tel: (06284) 5751, disc £24.95

A DATABASE dedicated to recipes and their ingredients, *Comp-u-cater* enables the user to create a menu chosen from the wide range of dishes held on the disc, find the correct recipe for each, annotate the quantities of ingredients required, scale the quantities according to the number of people eating and then produce a shopping list.

As with all programs dedicated to a specific purpose and containing a great deal of data, this one takes some getting used to. There are many options to choose from and you need to play with the program for a while before you feel confident enough to use it. The program contains a wide selection of possible ingredients, classified as to use and also by measurement type.

The hardware needed for this program is quite extensive as it requires a printer and, being disc-based, a disc-drive.

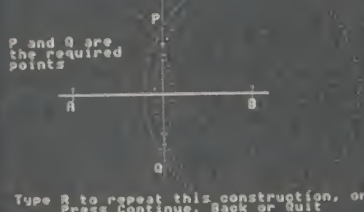
Not only may the in-built menu database be accessed, but there is also an opportunity for the user to create his/her own database with editing facilities to alter existing recipes. The whole structure is the familiar tree with the branches going out from the main menu page to the following:

Savouries, starters and soups 36 choices;
Main dishes 96 choices;
Vegetables 36 choices;
Accompaniments 24 choices;
Desserts 36 choices.

These subsequently lead to further sub-divisions into the categories under each main heading.

The flexibility of this program allows the computerised cook to program his/her way to culinary success, either within the confines of the author's recipes or by substituting new ones. **Nick Evans**

SECTION 5 - Loci
5 INTERSECTING LOCI - Example
AB is a line 9 cm long. Construct the points which are equidistant from A and B and also 5 cm from B



Building up to

O-levels

'Construction', Ampalsoft, PO Box 19, Knutsford, Cheshire WA16 OHE, tel: 056 589 3563, £6.95

AMPALSOFT don't undersell themselves in their blurb - 'A brilliantly designed series of action-packed exercises that skilfully eliminate the traditional drudgery from maths examination revision' - but their documentation leaves a good deal to be desired and these are demonstrations, not exercises. The four page booklet with this cassette does not tell you in any detail about what is included in the program, where it is to be found or how the construction may be done. Everything relies on the program, so you can't check halfway through a complex construction how one of the more minor constructions was performed.

Having said that, the presentation is very clear and quite methodical in its exposition - except for the main menu which is unreadable (why do people insist on using yucky green on white?). There is no testing facility, however, since the program is designed to be solely instructive. The only interaction is pressing 'c' or 'Space' to step the program on.

One comment made to me by a teacher was how did this differ from a text book? I replied that it was dynamic - it showed the construction developing - but when all is said and done, it's simply the machine drawing arcs, bisectors, tangents and loci slowly, and in a text book these would be printed, usually with tests too.

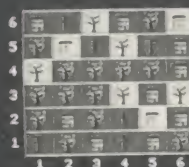
This may be useful as a demonstration tool for groups in the classroom and as a revision aid, but the language is simply that of text book geometry and there seems to be little advantage for the less able O-level student using this. It's quite clear and well presented - if you already know what you are doing.

Nick Evans

Thinking things

through

First set of clues
H H P
When ready press C



'Games of Deduction', Fernleaf Educational Software, Fernleaf House, 31 Old Road West, Gravesend, Kent DA11 0LH, tel: (0474) 59037, £35.95 (disc or tape)

LOGICAL reasoning programs have been quite popular in the educational market although they have tended to lack direction. This suite of four programs from Fernleaf is intended to 'help foster some aspects of the logical thinking process', and all the problems are of a remarkably similar nature but with slightly differing objectives.

'The Perfume Hunter' engages a group of children in a search through a grid for a given number of bottles, using a tracker dog. The group must develop its own strategies for finding the maximum number of bottles in the minimum number of moves in order to move up the league table of difficulty.

'Deliver the Message' also entails planning your way through a grid in the swiftest fashion, avoiding traps and guards by seeking out friends who will inform you about the location of the perils. Logical thought is needed.

In 'Find the Lady' you must study another grid filled with pictures and analyse clues as to her whereabouts. Three or four squares around the Lady's position are described and then the sequence is repeated for the squares immediately above or below.

Finally, 'Name the Square' has yet another grid - this time to be filled with colour. The players are told how many squares of each colour are present, and they may then either ask questions or make statements in order to fill the grid. One simple rule applies - the same colour may not be on horizontally or vertically adjacent squares.

These games are very good ideas with much educational thought and clear documentation, but whether the market is willing to pay the high asking price remains to be seen. **Nick Evans**



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061-969 4740**



Riding the crest

of a wave

'Waves', BBC Soft, BBC Publications, Schools Orders Section, 144 Bermondsey Street, London SE13TH, 40 track disc £14.95

DEVELOPED in conjunction with the BBC Schools Television *Science Topics* series, this package consists of a suite of programs supplied on two 40-track single-sided discs. Wave propagation and reflection are dealt with on one disc; reflection, interference and diffraction on the other.

A 40-to-80 track conversion program is included but a 40 track drive is still required to make the initial backup of the original discs. With this available, we found no difficulty copying both discs on to the two sides of an 80-track disc and then modifying the menu to access both sides.

Waves illustrates most of the wave properties that can be demonstrated on a school ripple tank and is best considered as a supplement to this rather than a substitute. The package is designed with the emphasis on simplicity. Parameters such as wave speed, wavelength and angle of incidence are chosen by single keystrokes from a menu or by using the function keys.

The animated graphics are bold and straightforward – wavefronts are shown as white lines on coloured backgrounds with different backgrounds for various wave speeds. Close up the animation is irritatingly jerky, but on stepping back from the monitor I discovered that, with the exception of the green background used for the slowest wave speed, the display was easily visible from the back of the classroom and movement appeared quite smooth.

Other choices available are: plane or circular wavefronts, plane or curved reflecting surfaces (reflection), plane or curved medium boundaries (refraction), wavelength and slit separation

(interference), and slit width (diffraction). There are several facilities including the ability to freeze and to single-step the wave motion.

There is also a facility to print the screen on an Epson printer. This is a wonderful idea to anyone who has ever had to draw an interference pattern by hand, but why does the screen dump insist on sending both a CR and LF at the end of each graphics line? The inclusion of the line feed requires that the Epson's response to this character be switched off at the printer to avoid double spacing.

Refraction is always difficult to demonstrate convincingly with a ripple tank and this is one area where the package can usefully fill some gaps. I was especially impressed with the ability to exceed the critical angle and to show the onset of total internal reflection. On the other hand, it's a pity that the program cannot cater for a pair of medium boundaries to demonstrate prisms and lenses.

Put to the classroom test, this well-documented package proved to be one of the few computer teaching aids that really works, where the micro becomes an efficient but unobtrusive tool.

Tony Merrett

Story-telling

tales

'Story', H & H Software, BBC B, £6.50, disc £7.25.

THIS menu-driver program enables children to write stories and illustrate, save and print them. Old stories can be reloaded and altered.

The tape or disc includes a three-page story called WALK, and the instructions for loading this and making alterations to it form the basis of the first part of the 16-page handbook. Changes can be made by using the cursor control keys and overtyping, or by using the Delete key.

Automatic wraparound is provided, and if the story is more than four lines long the text size shrinks to make room for up to seven lines. It's also possible to add pages to the story, up to a maximum of seven.

The pictures can also be added to, using either the suite of 64 pre-programmed pictures, or the 'draw your own' option. Access to the suite of pictures is quite easy. A list is scrolled across the bottom of the screen and when the required picture is spotted the pupil presses the space bar, then types in the name of the picture. This then appears at the bottom left of the screen. The cursor control keys are



then used to position it on the drawing area.

Once completed the story can be saved to cassette or disc and can also be printed out. Included in the program are routines to work with Seikosha and Epson FX and RX printers, and memory space has been set aside for other printer routines to be added.

I was attracted to *Story* as a means of enabling slow-learning pupils to write and illustrate short stories. On first viewing the program it seemed to have potential in this area, but subsequently I began to have doubts.

The program allows up to seven pages for each story. If the text is up to four lines long it's printed in double height. The inclusion of a fifth line causes the text to revert to single size, and up to seven lines may be accommodated. I found that text being entered on a new page was only printed in double size if the picture had been drawn first, even though text and graphic space was already allocated on the screen. This may seem a minor point, but the sequence in which individual children work through a story-writing exercise should not be predetermined in this way.

The remainder of the text handling facilities are reasonably easy for children to understand, and there are options of overwriting or deleting text. This is quite adequate as an introduction to wordprocessing and more complex editing facilities would make the program too difficult for the children it's aimed at.

The picture-drawing facilities are the weakest part of the *Story* package. They are too sophisticated for all but the brightest pupils in its target age range. The 'draw your own' option is obviously intended for older children but for them the text handling part of the program would be limiting.

On the whole I think the package is a reasonable attempt to combine simple wordprocessing with a graphic element, its main disadvantage being the lack of simple controls for the graphics.

B Steeper

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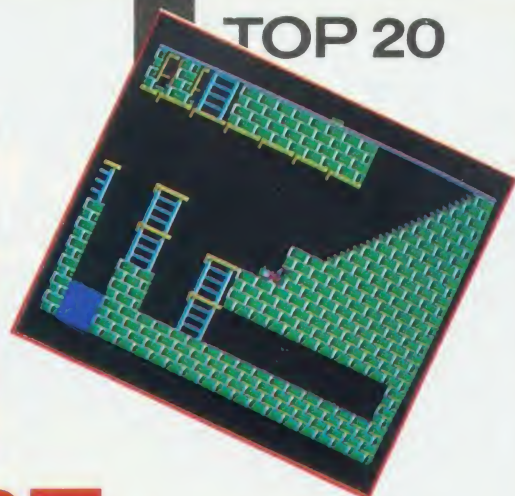
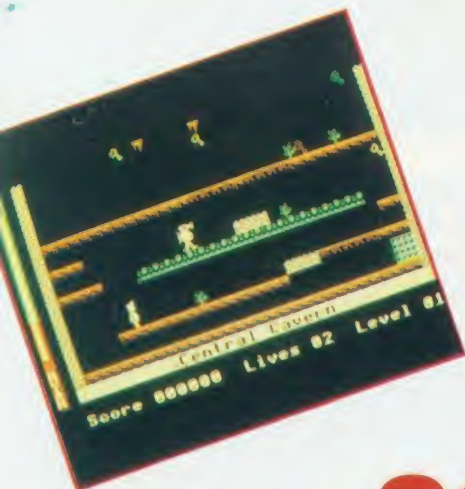
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SOFTWARE CHART

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TITLE	PUBLISHER	PRICE	MICRO	REVIEWED
1 (-) Castle Quest	Micro Power	£12.95 (£14.95)	B	March '85
2 (1) Elite	Acornsoft	£14.95 (£17.95)	B/E	October '84
3 (3) Blockbusters	Macsen	£7.95	B/E	
4 (5) 3D Grand Prix	Software Invasion	£9.95 (£11.95)	B	February '85
5 (4) Sabre Wulf	Ultimate	£9.95	B	
6 (2) Frak!	Aardvark	£8.90	B	September '84
7 (8) Pole Position	Atarisoft	£9.99	B	February '85
8 (9) Football Manager	Addictive	£7.95	B	March '85
9 (10) Manic Miner	Soft Projects	£8.95	B	May '85
10 (6) Scrabble	Leisure Genius	£12.95	B	
11 (7) Eddie Kidd's Jump Challenge	Martech	£7.95	B/E	March '85
12 (-) Combat Lynx	Durrell	£8.95	B/E	
13 (re) Mr Ee	Micro Power	£6.95 (£9.95)	B	March '85
14 (17) Chukkie Egg	A&F	£7.95	B/E	September '84
15 (12) Jet Pac	Ultimate	£7.95	B	
16 (re) Aviator	Acornsoft	£14.95 (£17.95)	B/E	May '84
17 (20) Snooker	CSM/Visions	£8.95	B	
18 (19) Hobbit	Melbourne House	£14.95	B	
19 (re) Micro Olympics	Database	£5.95 (£7.95)	B/E	
20 (re) 747 Simulator	Dr Soft	£7.95	B	

B=BBC, E=Electron, re=re-entry Prices in brackets are for disc version.

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165

The key:
select using the number or
letter specified above

Tab to test
Return to analyse

Screen title

Ladder

Trampoline

Graphics cursor

Bricks



Use cursor keys to move
graphics cursor around

Finishing point

Conveyor belt -
left and right moving

Slide

Ice

Eating your way out of trouble

'Magic Mushrooms', Acornsoft, £12.95

A GAME that encourages you to swap screens with your friends can't be all bad, especially when it's this latest stunner from Acornsoft.

The hero of this fungoid adventure is a Harry Sinclair look-alike sprite, whom you must guide around a series of obstacles picking or eating (I'm not sure which) mushrooms as you go and avoiding the red meanies who scamper to and fro with a mind of their own.

Magic Mushrooms is a platform game, the sort where you need to climb and ramble all over the screen as you collect points, avoid death, and work your way back to the starting position, all within a hectic 100 seconds time limit—phew!

There are nine screens and you can choose which you want to play around with. They have titles such as Fair-

ground Fun, Non-stick Nightmare and even the Curse of the Lemmings.

This game's originality lies in the fact you can design and edit your own screens. Using one of the ready-made screens, you can move the 'part' cursor to the desired position and select the part you wish to insert from the graphic menu of 15 items at the top of the screen. You get a good assortment too. Standard bricks are easy, but slippery customers will appreciate the ice—Torvill and Dean are in no danger with my rendition of *Bolero*, but our hero can cope with the aid of some nifty key controls. One of my favourites is the conveyor belt—it's slow going, rather like walking up an escalator the wrong way but if you ease up you're shot off in the opposite direction!

Getting onto higher levels is not always easy either. Ladders help but that's too simple a solution; try the trampoline—it's a classic.

Moving downwards can be undertaken in a variety of ways. There's the gravity-assisted method—not to be advised, though, as you end up losing one of your three lives. However, the superb judder you get on crashing to the floor is almost worth it. It's possible to construct slides, but they are slow and meanies can stroll over and wait at the bottom for you.

The rocking platforms are quite nauseating, as is the thin ice which disappears as you walk on it.

Once you have designed your screen you can give it a test drive. Pressing TAB makes random mushrooms appear, then off you go, using just three keys.

Too hard or too easy? Just re-edit to the desired result, save it and post it to your mates.

What's magic about mushrooms? A lot. It's great stuff; go and buy it—you won't be disappointed. **Bruce Smith**

Access a world of Information WITH YOUR BBC MICRO

Today, there are literally hundreds of databases worldwide which can be accessed by your BBC micro. These include Prestel, Micronet, Homelink, Telecom Gold, various 'Bulletin Boards' and massive American data bases such as 'The Source' and 'DIALOG'. The equipment can also be used to send telex messages. The Pace range of inexpensive communications products are designed to provide accurate data exchange whilst being extremely flexible and easy to use.

NIGHTINGALE - The Modem



In order to use a versatile modem like Nightingale to its fullest potential, you will require equally sophisticated software. This is where Pace can offer you a total solution — Commstar, unquestionably the most comprehensive communications software available for the BBC. Commstar is currently the only package for the BBC micro which offers easy access to Prestel (and other viewdata services), together with user to user communication and exceptional file transfer capabilities.

Supplied on Eprom, Commstar is instantly accessible, simple to use and extremely flexible. Just look at the possibilities:- access Prestel, Micronet, Viewfax, Homelink and Telecom Gold, rummage through bulletin boards and chat to literally thousands of other computer users, but there's more. Commstar's versatility enables the BBC to be used as an inexpensive work station for a main frame or mini-computer.

The complete Nightingale/Commstar package for the BBC micro including the modem, cabling and the Commstar Eprom and manual is just **£139 plus V.A.T.**

Nightingale is available separately for the BBC and other computers at £119 plus V.A.T. and Commstar is £29.57 plus V.A.T. Further details are available, please telephone or write for comprehensive fact sheets.

Nightingale is by far the most versatile modem available, at the price, for either home or business use. It offers Prestel/Viewdata baud rates (1200/75 & 75/1200) alongside 300/300 baud full duplex for communication between the BBC and other computers, including bulletin boards.

Nightingale has a built-in expansion capability, allowing the addition of auto-answer and auto-dial with battery back-up. The state-of-the-art modem chip technology employed in Nightingale requires minimal support circuitry resulting in low power consumption, low cost, high quality and extreme reliability.

Nightingale being 'hard wired' is not subject to the noise interference errors common to outdated acoustically coupled devices. In addition Nightingale features a simple self-test facility for easy installation.

Nightingale utilises a fully buffered RS 423/232 serial interface and is supplied complete with a lead suitable for connection to the BBC micro, other leads are available on request.

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Setting out on

the right track

'Gateway to Computing' Books 1 and 2, Ian Stewart, Shiva Publishing, 64 Welsh Row, Nantwich, Cheshire CW5 5ES, £4.95 each

THERE are plenty of Basic tutors on the market and another one might seem unnecessary, but close inspection of Ian Stewart's offering dispels such thoughts.

Targeted at the teenage market, this series aims to give the young computer owner the 'kick in the pants' needed to get started with Basic. The text ranges from the mildly amusing to the hilarious, with serious instruction on how Basic keywords operate wrapped up in a mixture of goonish-cum-Kenny Everett humour.



Several characters accompany you on the journey of discovery, with such unlikely names as Ivan Nokyablokov and Carlton Q Cashsnitcher. Sherlock Holmes and Dr Watson are your guides to debugging and their conversations cleverly present the user with an accurate and logical picture of the way programmers speak to each other while debugging programs.

The explanations are very clear, and there are summary blocks at regular intervals reminding you of what has been said, and tests involving either program creation or problem solving. Most of the programs are essentially frivolous, but they are intended to be simple, quick and effective examples, rather than to undertake tasks, which is not the purpose of these books. Any young person would be hard-put *not* to learn about Basic from working through them.

I have my doubts about using them in the classroom as in Book 1 the user is instructed to print 'get stuffed!' as part



of a program. One person to whom I showed the book objected, saying that she would never buy it for her child solely because of this. Extreme? Well it depends what you are looking for, but it did seem to lower the tone of an essentially good set of books.

As far as the actual programming content is concerned it really can't be faulted – one minor criticism is the constant use of LET which is an irrelevant keyword in BBC Basic. Otherwise, everything from STEP to STOP and DIM to DATA is covered in a thorough fashion.

Presented in a large format and clearly printed, these books represent excellent value for the teenage computer buff.

Nick Evans

For new DFS

users only

'Disk programming techniques for the BBC microcomputer', Michael Coleman, Prentice Hall International, £7.95

THIS book is aimed strictly at new users of the disc filing system, particularly the Acorn DFS, though two others are mentioned. Anyone accustomed to using and programming with the DFS will find little, if any benefit in it and this is my main reservation. Its useful lifespan will be one reading as it contains little you might refer to again.

The first half is an expansion of the DFS 'User Guide' and the sections on Basic handling of files in the main 'User Guide' – these books are much quicker and clearer reference sources. The author does, however, explain and expand on the various commands in a clear and amusing style, but it's a pity that he's made some mistakes.

Perhaps the worst omission is not to stress that a file called 'NAME' is the same as 'name' or 'NaMe' etc. I lost several programs this way in the early

days when changing from tape to disc. A simple Basic program relocater is provided but there is no mention of the simple trick of changing PAGE to a lower value before loading.

The chapters on data files are more useful with descriptions of serial and random access; how they differ, when to use them, and some tricks such as linked records. However, once again errors creep in, particularly on just what the various Basic commands do. Obviously Mr Coleman didn't read my article in *Acorn User* trying to put the record straight! The oddest is about how to extend random access files (though for some reason he doesn't expect them to need expanding). It's really very simple; push the pointer PTR£ past the end of the file, and lo and behold it's bigger! The only problem is lack of space on the disc. Making an artificially long file with *Save or



writing lots of dummy records makes the use of EXT# and EOF£ pointless.

The second half of the book consists of seven case studies, giving examples of ways in which the disc system can be used. These are well documented and could be used as a basis for more useful and user-friendly programs. The most helpful are the database programs, though the author insists on using *Save to create the file and thus limit its length. How are you supposed to know how big to make a file for data which may increase?

A disc with all these programs on is available separately along with a useful database of articles on the BBC micro. This is 40 track only, and contains at least one silly error (listed correctly in the book).

In summary, I was disappointed. In the early days of the BBC micro books understandably contained errors and omissions. Surely enough is now known, and indeed published, to expect a book to contain accurate and complete information.

Richard Harris

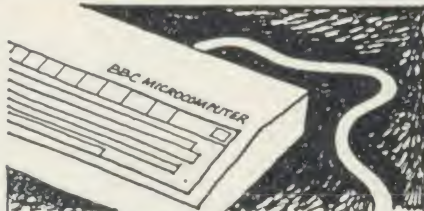


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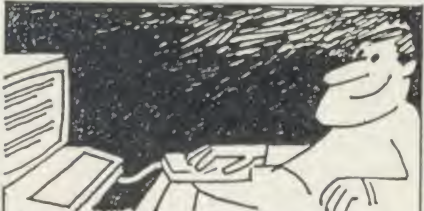
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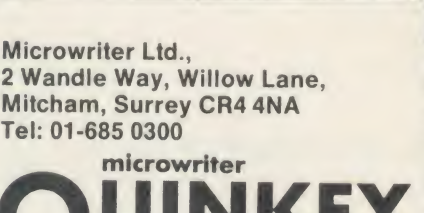
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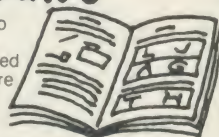
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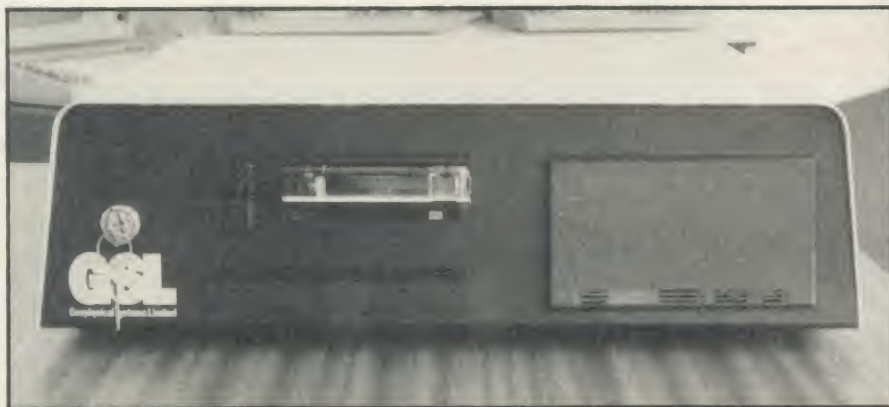
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Sophisticated

system

GSL hard disc and net package for schools, Geophysical Systems, Westport Way, Andover, Hants SP10 3SG, tel: (0264) 59633, prices on request

IF YOU are using BBC micros in a school, or are interested in the use of hard (Winchester) discs with the BBC, our experience at Seaford College may be of value to you.

We teach computer studies at O and A level and all fourth formers have a weekly computer lesson. Until last year we used Level 1 Econet with our Beebs, a cumbersome system fraught with problems. We seem to have found a solution in the GSL system which gives you a reliable network as well as 5 to 20 million bytes of storage.

You use the normal Econet hardware in each station of the net and replace the Econet ROMs with E-net ROMs (£15 each). You install a fileserver ROM (£155) and connect that micro to the hard disc via a single cable from the 1 MHz (not disc, which is the same size) interface connector.

PAGE is set to &1900 in a BBC B (or &1400 in a model A) with floppy interface (not &1B00 as with Econet). You do not have to boot FS.

You can use the fileserver BBC almost as if it were not doing anything else. Anyone can send things to a printer connected to any station on the net. The default printer server is station 0 – this must be the fileserver. The station with the printer can be used almost normally while others are using the printer.

We no longer lose discs and things that we save to our backing store are still there the next time we try to load them. (Data on the hard disc can be backed up on floppy discs. More sophisticated backup devices are to be released shortly.)

I'll explain the file structure of the hard disc. If *CAT listed every file on the

hard disc, you would soon be in trouble; the solution is a hierarchical file structure. There is a main catalogue, and from that you can go (or are automatically taken) to sub-directories, which in turn can lead to lower levels. Typically, each user would have a sub-directory of his own. Once logged on (an easy process) to his or her sub-directory, it would be difficult for the user to know if he or she was talking to a floppy or a part of the hard disc.

Having the hard disc – and the file-server that comes with it – is like having a servant at the old Econet floppy drive to change discs for users. Users type *GOTO 23 to 'put disc 23 into the drive.' After that *CAT, SAVE, LOAD, etc work as if the user were connected to a floppy.

What about data privacy? Will Jones swipe Smith's program, or worse, *DELETE it? Not if Smith and Jones are peers. The system supervisor assigns passwords and priority codes to anyone who may save things on the system. Each user has one or more 'discs' of their own. Only senior (high priority) users may alter the contents of someone else's disc. You can't even see what's on someone else's disc unless your priority is greater than theirs.

What if you want someone else to see one of your programs? You must change the program's access code. *ACCESS PRGM 9 would make PRGM 'visible' (and loadable – but not deletable) to anyone with a priority of 10 or higher. This is useful for teachers – a file's priority can be set so that the file can be read by pupils but cannot be tampered with.

It's not necessary to give every user a password. Pressing 0/Break will give anyone read only access to any file with a priority of 0. *AUTO 8 will do what Shift/Break does with a floppy that has been configured to auto-boot. (The 8 says which 'disc' from the hard disc's surface will be booted.)

The manuals supplied are comprehensive and well organised. There is a user's guide for the general public, and

a supervisor's guide which goes into such things as assigning passwords.

Our system is all contained in one room, but a 500m network is possible. So far we are only using the disc to replace our floppies, which doesn't exercise all the features of the system. It is provided with versatile *VIEW, *REMOTE, etc commands for a larger installation, or for more control, supervision or help by the teacher. Messages can be passed back and forth over the network between client stations and the fileserver.

Some calculations comparing the costs of floppy and 10 Mb GSL based-systems indicate that in terms of cash the break-even point comes at about 15 stations. Building a system around a hard disc saves you most of the trouble associated with floppies – no more missing discs, mysterious deletions, vulnerability to dust. The GSL hard disc's network must also count as a major benefit in choosing this option – the costing exercise did not include a printer for each station.

In favour of the floppy option, one could point out that if the hard disc were to go down, the calamity would be proportional to the number of stations attached to it. We are keeping some floppies for backing up work and emergencies. As long as the 'discs' of the hard disc look like floppies (size, filenames, number of files), one can *BACKUP from the hard disc to a floppy, and the data can be restored on to the hard disc as easily. At the moment, the floppy server must have the Amcon DFS in it, but GSL are working on this and the Acorn DFS will be acceptable soon.

As far as alternative hard disc systems are concerned, SJ Research are building something which is more hardware intensive but more expensive. Torch do a hard disc, but to access it each of your Beebs must be fitted with over £300-worth of gear to make what comes out look like CP/N, (which is or is not CP/M depending on who you ask).

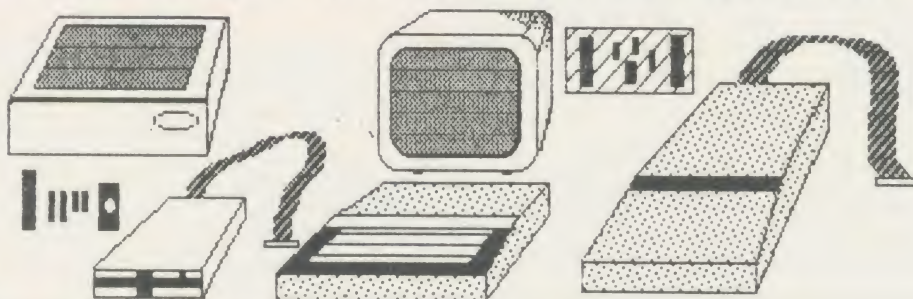
There are a few problems with the GSL. Catalogues are not in alphabetic order but this may be rectified in a later revision of the software. Until the file-server doesn't require the Amcon DFS, there isn't a simple way to transfer data files from floppy to hard disc. The next version of the disc utilities (available to the supervisor only) should allow *COPY from an Acorn DFS floppy to the hard disc, I believe.

GSL has been unfailingly courteous and thorough in dealing with questions that have arisen. We have found that pupils learn the essentials of saving and loading files with a 15 minute lecture to the whole class and the supervisor can master his powers easily. **Tom Boyd**

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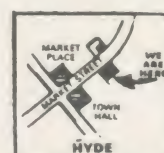
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Saving the

human race

'Robotron: 2084', Atarisoft, BBC and Electron, £9.99

IN *Robotron: 2084* your task is to kill all sorts of nasties and save your fellow humans from the robots.

These robots attack in waves, and on the first, there are fifteen. You soon realise they are programmed to kill, and will simply come straight for you! Fortunately, you have a powerful weapon system—a rapid fire laser gun—and the first few screens are little problem. After the eighth, you can get into real trouble, however. There are so many different types of nastie coming at you, such as the red discs which take great delight in distributing what look like little bullet-throwing gravestones, and the brains which... well, see for yourself on level five.

Once you have exterminated everything that is killable on a level, you proceed to the next. If, in all the chaos, you manage to rescue some humanoids, there are large bonuses available which go a long way to a good score. Bonus lives are awarded every 20,000 points—you'll need them!

The graphic quality of *Robotron* is very good. There are many different aliens, and my greatest praise is for the sheer speed of operation, especially when you consider how much is going



on at once. Almost everything moves, and the action is smooth. Sound is fairly good, too; there is a wide variety of noises and they are well implemented.

As usual in Atari's games, there are many options available to the player. You can choose a one- or two-player game and the sound can be switched off. It's also possible to start on any of the first nine levels, and to freeze the game. You can control *Robotron* by keyboard or one or two joysticks; the keyboard option is a little hard to get to grips with, as there are eight keys

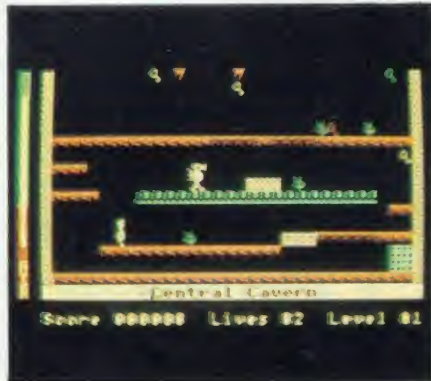
used—the two-joystick option may be easier for some.

Altogether, a fast action game, very difficult in later stages, with good graphics and sound, and which gives you a real feeling of achievement when you master the controls! A worthy addition to any shelf. **Stuart Menges**

Going

underground

'Manic Miner', Soft Projects, BBC, £8.95



ONE OF the best known Spectrum games, *Manic Miner*, is now available for the BBC micro. The idea is to guide Willy the miner around a series of screens, collecting a set of objects, before his air-supply runs out. Once all the objects have been picked up, the exit begins to flash, and our hero moves onto the next screen. Usually, you pick up keys, but coins, bananas, etc are also found on some levels.

Once the game is loaded, a security code must be entered from a large number of combinations. If you wait, a demo runs, so you can see each screen in turn.

Controlling the character is simple, there are only three keys to worry about—Z and X move you, and you use <Ret> to jump.

As far as sound goes, there is an annoying tune, playing all the time, but the other sound effects are acceptable. Fortunately, Q will kill the tune but not the rest of the sound. Graphics are better, but not outstanding, and the movement is smooth. Some of the animation on later levels is very good—spinning triangles, mutant telephones, and, perhaps best of all, a bouncing cheque!

Each screen is well presented and designed, and has its own problems. The key to success is forward vision and precise timing. *Manic Miner* is already established on the best sellers list for the Beeb. At £8.95, it's on the expensive side but not too much above the inflated average. **Stuart Menges**

A-maze yourself

'Maze', Acornsoft, Electron version £9.20, BBC version £9.95 (disc £11.50)

SOME games, like *Snapper* and *Frogger*, have staying power. Another sure to join the ranks of the stayers is *Maze* from Acornsoft.

You have just entered a top-secret installation of a rival company with the aim of stealing some secret information. The baddies are robot guards who will, of course, shoot you on sight.

Your mission, should you decide to accept it, is to locate three secret keys scattered around the randomly-drawn 3D maze, and place them in the indestructible iridium box (what else?). Then you can take the new key within, work your way back to the lift and elevate yourself to the next level. Once there you are faced by an extra robot and a more complex maze.

The keys themselves are represented by different coloured squares situated on the floor. Should you happen to come across the iridium box in your travels, its position remains displayed on the plan view of the maze so that you can find your way back to it.

The maze itself isn't fancy but is very effective, scrolling steadily and without judder, and usually responding quite quickly. Pressing V supplies you with a plan of the parts you have already explored, with the robots and their respective positions shown.

When a robot approaches, echoing footstep sounds emanate, and when it appears in the corridor before you, pressing F will fire one of your three bullets to blast it to smithereens (if it



hasn't already beaten you to the draw). Shooting one doesn't really make things any easier, as it is immediately replaced by another robot.

Maze has certainly become my favourite pastime for the moment, and I'm sure I'll be playing it for some time to come. And if that isn't a recommendation, then I don't know what is!

Bruce Smith



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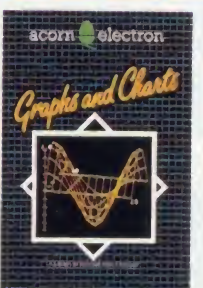
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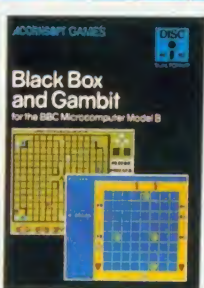
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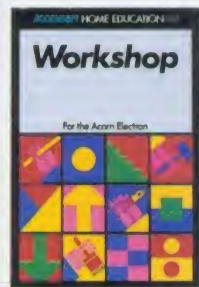
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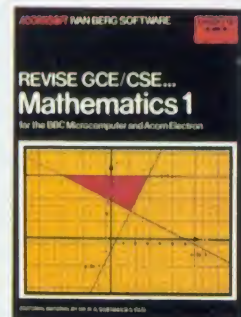
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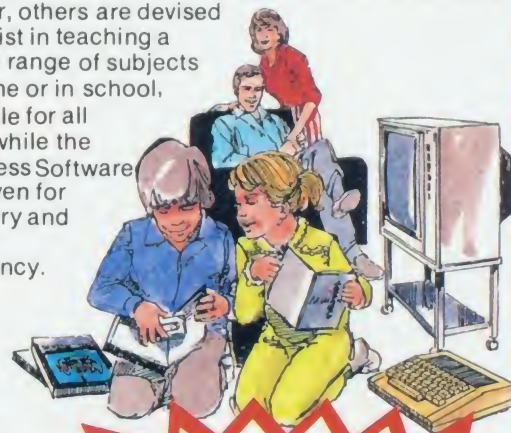
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SWEET-TALKING -BEEB-

'Sweet Talker' speech synthesiser, Cheetah Marketing, 24 Ray Street, London EC1R 3DJ, tel: 01-833 4909, £24.95

CHEETAH'S *Sweet Talker* speech synthesiser at £24.95 must surely be the most inexpensive way of adding synthetic speech to the Beeb. So just what do you get for the price, and how does the product shape up?

The hardware could hardly be simpler and less obtrusive. A small circuit board of some 3in by 2in holds the speech synthesiser chip (the popular General Instruments SP0256), and a modicum of external components.

The whole assembly plugs into IC99 on the Beeb's main circuit board via an IC socket mounted on extension pillars. The unit requires a fair amount of pressure to be driven home, and I would recommend that users unscrew the main circuit board from the Beeb's casing, so that it may be supported from the underside during insertion. This helps minimise the risk of hairline cracks appearing in the PCB tracks.

Since IC99 is very close to the ribbon cable connecting the keyboard to the BBC's circuit board, space is a little tight, but it should be possible to install the unit without exerting undue force on any component.

There are no tracks to cut, soldering to be done or awkward flying leads to connect. In fact, being so small, the speech synthesiser should not impinge on other hardware fitted inside the Beeb, such as RAM/ROM expansion boards, but check first!

The software accompanying the package consists of a cassette-based program, 'BeebTalk'. Not only does this provide an entertaining demonstration of the *Sweet Talker's* capabilities, but the code is also meant to serve as an example of how to program the speech chip.

To generate speech, *Sweet Talker* uses an approach based on allophones, which can be considered as the fundamental building-blocks of speech. When fed with a number between 0 to 63, the synthesiser chip can generate one of 59 distinct allophones, plus 5 different periods of silence.

The allophone technique used in Cheetah's synthesiser does not produce particularly natural-sounding speech, as human speech is not, unfortunately, a series of discrete sound segments. The advantages, however,

Vincent Fojut lends an ear to a low-cost speech synthesiser

are that it is easy to program, very cheap, and should allow any English-language phrase to be synthesised.

In fact, the demonstration software goes even further, with humorous results. In addition to 'speaking' in English, the program attempts three other languages—French ('Bonjour'), German ('Guten Tag'), and that other well-known 'foreign' tongue, Scottish (yes, the inevitable 'See you, Jimmy!').

The 'BeebTalk' program includes a short machine-code routine, together with examples of how to call it from Basic, to generate the words of your choice. It works in the following way. Take your phrase and break it into its constituent allophones, then convert these into their corresponding numeric codes, and embed the string of numbers in a DATA statement. By calling the machine code routine with each number in turn (for example, using a FOR . . . NEXT loop), the synthesiser chip should then generate the required sounds.

For example, the phrase 'Acorn User' can be built from the following allophones (using Cheetah's notation):

EY, KK3, OR, NN1, YY2, UW1, ZZ, ER1.

These, in turn, give the following numbers:

20, 8, 58, 11, 25, 22, 43, 51.

In practice, the string would probably be terminated with a 'silence' code, such as 0, which effectively turns the device off. Without this extra code, the synthesiser would continue generating the last sound issued, which can be very disconcerting!

While the above approach does work, it obviously has drawbacks. There is no clear correlation between the numbers used, and the sounds which they produce. Consequently, building up even quite short phrases

becomes a tedious exercise of conversion and cross-referencing.

In order to simplify the task of programming the device during evaluation, I wrote a short program to allow input to be made using the allophones themselves, leaving the computer to convert them to the appropriate numbers before feeding them to the speech chip. This was a relatively straightforward exercise, and code from Cheetah's own demonstration program was incorporated (as it is intended to be) with minimal effort. I could then type in a string such as 'HH1EHLLOW' to produce the word 'hello'. Not ideal, but much better than a string of meaningless numbers. I leave it to others to take this one stage further, and write a program to generate speech from 'normal' English text (do not underestimate the enormous complexity of this task!).

As far as speech quality is concerned, the 'voice' is unmistakably synthetic, with a falsely high degree of hissy, white noise in a number of sounds. Certain allophones are particularly dubious—the 'W' for example, just doesn't seem to make the mark. Indeed, the untrained listener may be hard-pressed to distinguish many sounds that the synthesiser produces. The monotonal quality of the voice not only sounds artificial, but also becomes irritating after a while.

Cheetah's demonstration program craftily displays each phrase as the speech synthesiser generates the sounds. In a sense, this is cheating (excuse the pun), since it is much easier to 'understand' the device when you already can see what it is trying to say! A more accurate appraisal of its fidelity can be had by listening to the program (the first few times, especially) *without* looking at the screen. Most friends I tried this on were unable to make out some of the words at first.

However, intelligibility does improve, not only as one becomes more used to the characteristics of its own particular 'voice', but also as one learns to program the unit more skilfully.

The *Sweet Talker* seems ideal for those wanting a low-risk introduction to speech synthesis, especially where fidelity is not of critical importance. Above all, the device is fun to use, relatively easy to program and provides considerable enjoyment at minimum cost.

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- Ability to dynamically alter control of ONESHOT.
- ONESHOT can be configured to run in any area of memory.

ONESHOT is a 1.25kb machine code program which gives the user several powerful aids in debugging BASIC programs. These include the ability to SINGLE STEP through the BASIC code of the target program, stopping the processing at specified points and comprehensive trace functions of the variables used by the target program.

A very powerful option allows the user to enter a command string into function key 0 and instruct ONESHOT to obey this command BEFORE each line is executed e.g. *KEY0 PRINT X%; M will print the value of X% before executing each line. This is a very simple example and it is possible to do much more complex things including printing the value of a variable only when it changes or when it reaches a certain value or falls within a certain range. This option can also be used to dynamically alter ONESHOT as it is working. The power of this option is only limited by the users ingenuity. In addition to ONESHOT the disc also contains 3 very useful function key routines. The first will search for any DEFPROC or DEFFN and print the line numbers in which they appear together with the name of the procedure or function. The second will search for a specific procedure or function and print the line numbers containing it. The third routine will print out every active variable together with its present value. ONESHOT is not compatible with double density interfaces.

NEW

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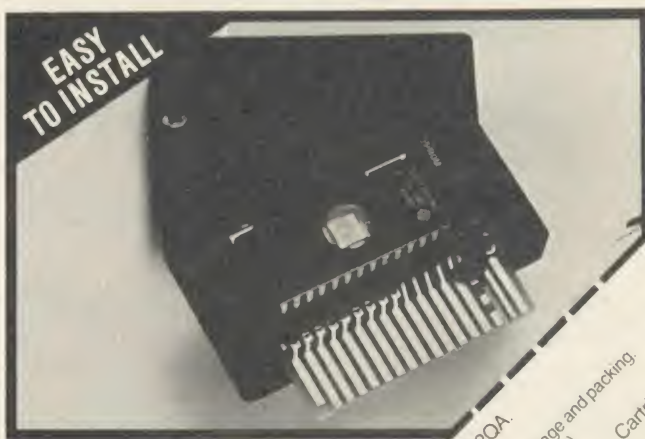
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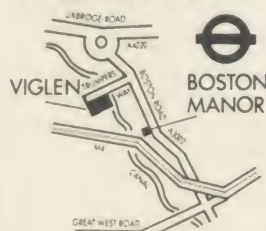
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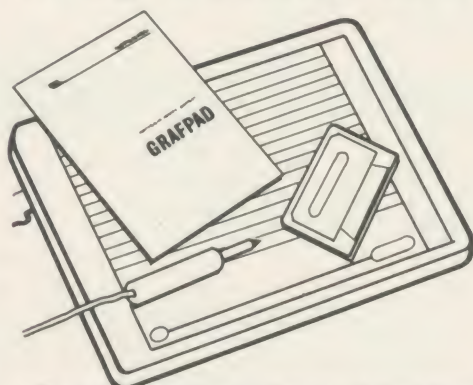
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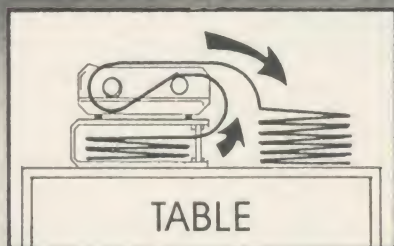
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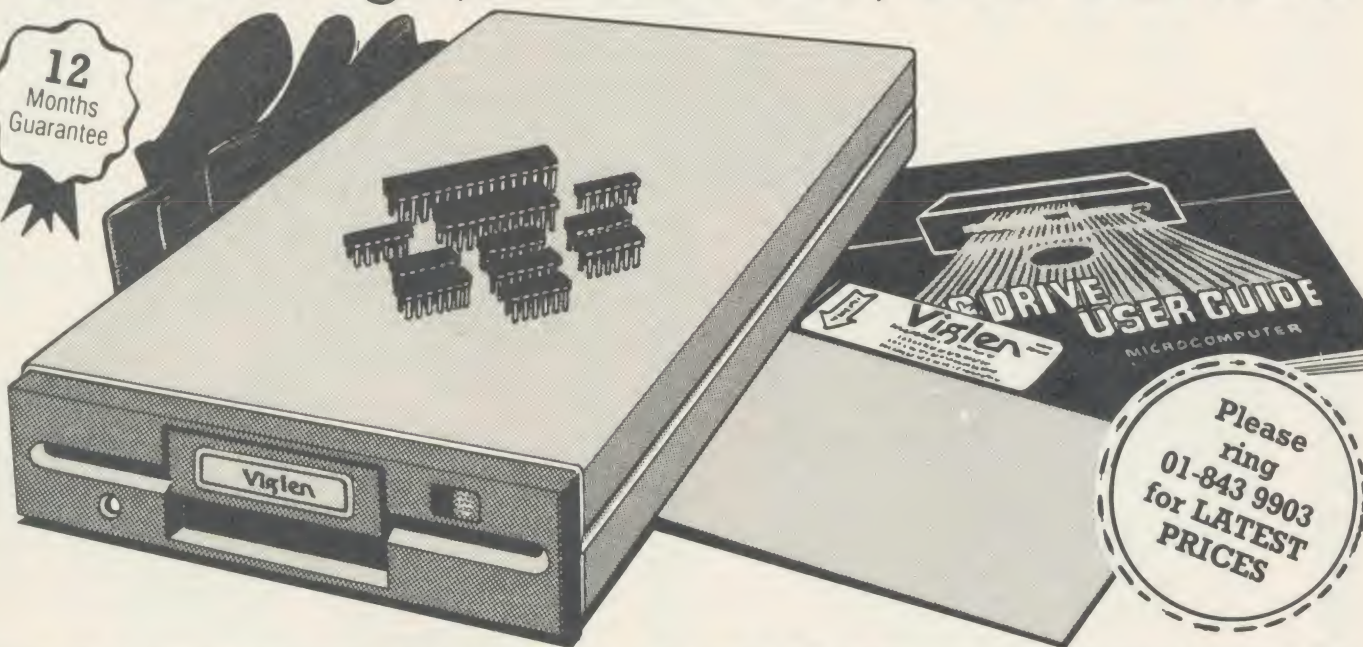
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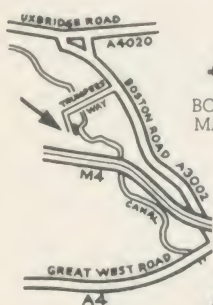
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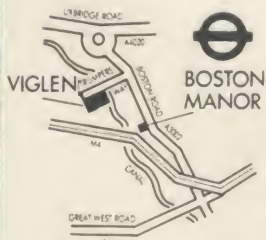


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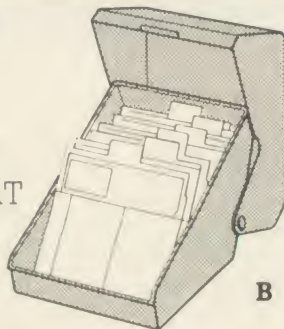
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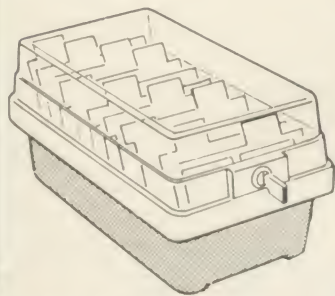
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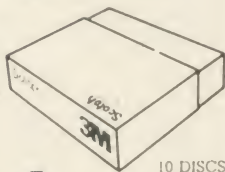
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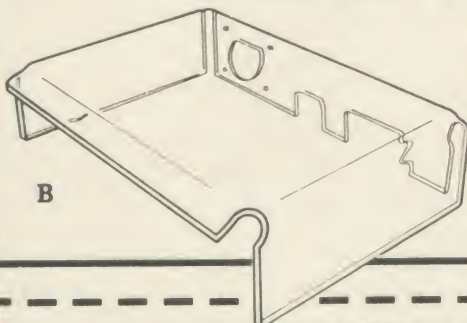


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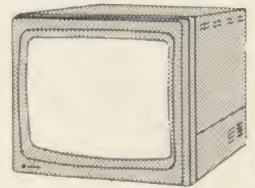
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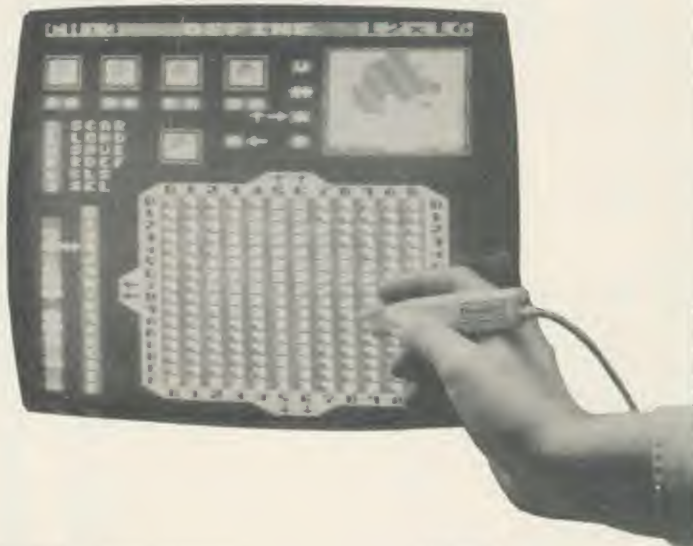
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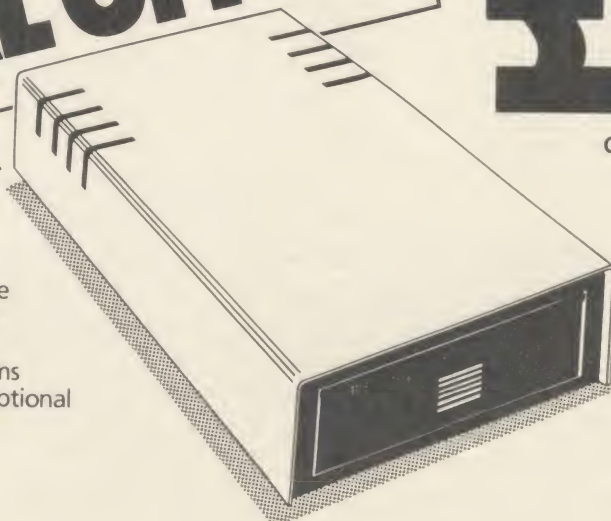
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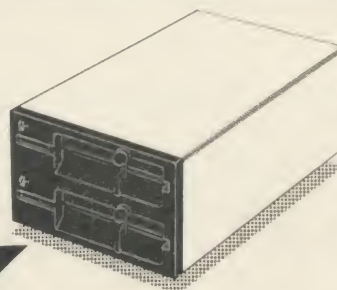
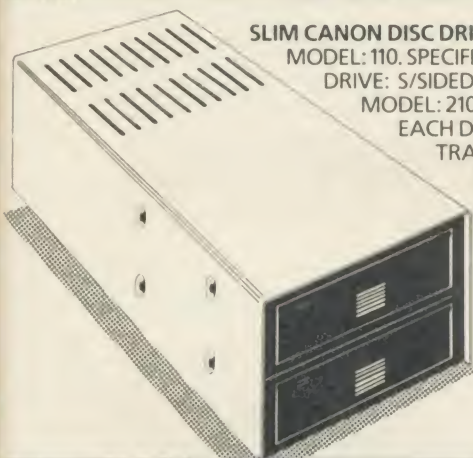
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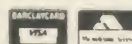
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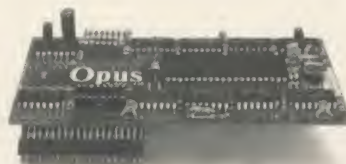
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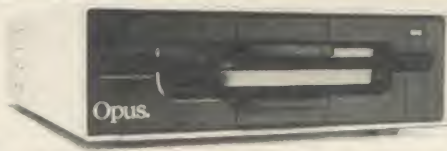
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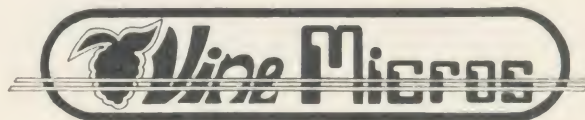
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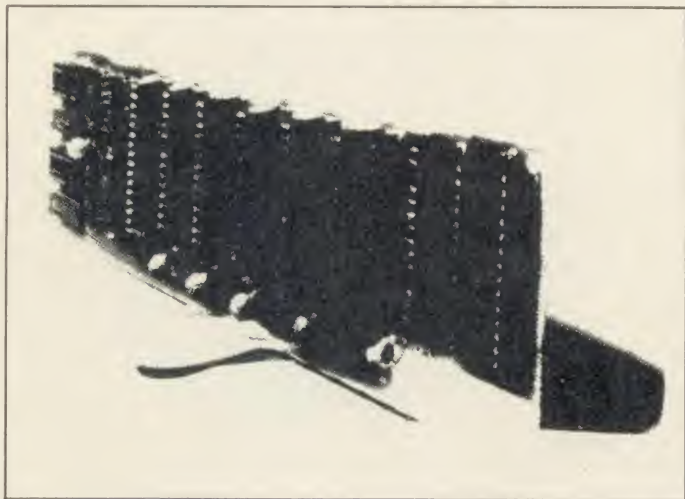
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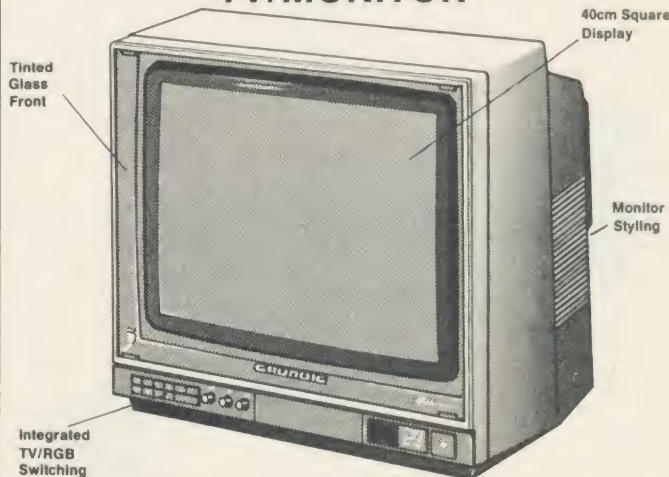
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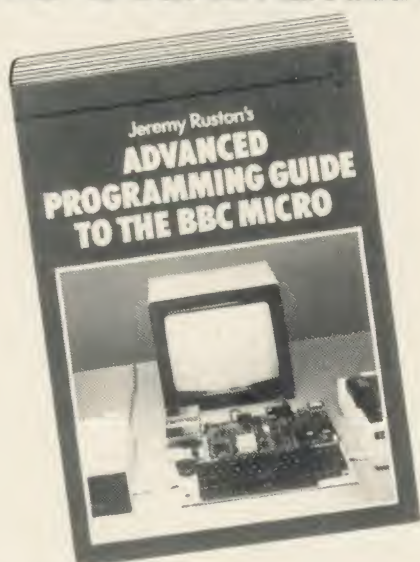
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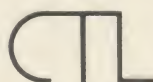
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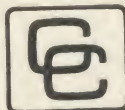
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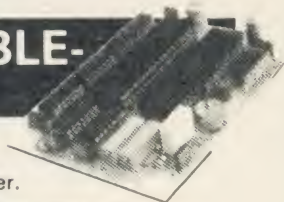
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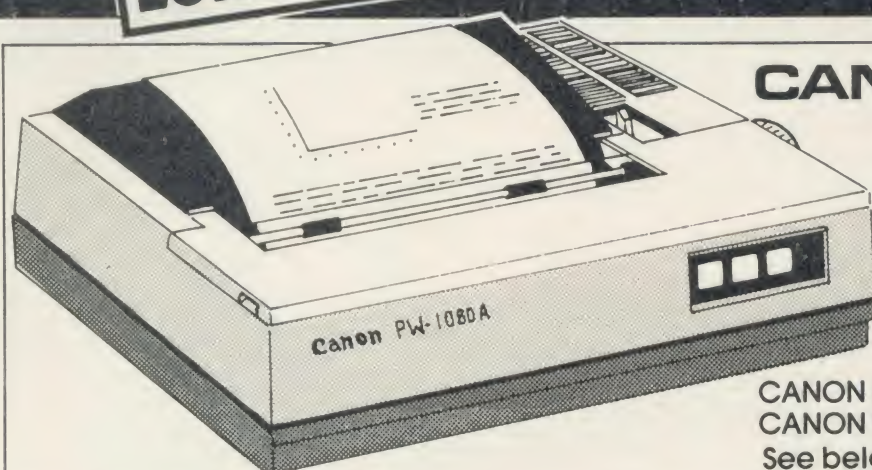
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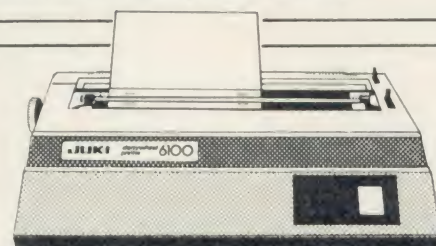
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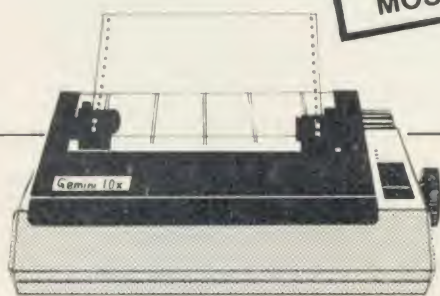
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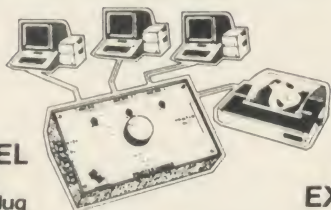
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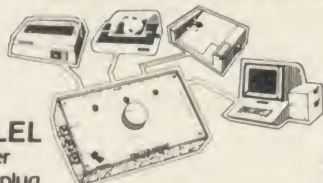


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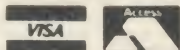


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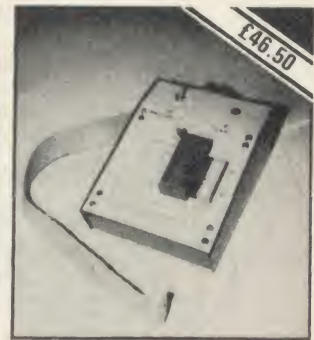
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A tale of men in the land of fen

ONCE upon a time, deep in the land of Fen, there lived a physicist called Mr Germann. Now Mr Germann was very clever and one day he discovered a new atom. Mr Germann was very pleased with his new atom and told his friend Mr Hurry all about it. 'Mr Hurry,' he said, 'I've discovered a new atom and I'm calling it Uranium.'

Mr Hurry was also very excited about this discovery and, having a sharp eye for business, realised there might be some money to be made. So he set off down the road with a pile of atoms to sell.

Mr Hurry was a good salesman and he had soon sold all the atoms. So Mr Germann found more and Mr Hurry sold more and they started making lots of money. Mr Hurry knew all about markets and one day said to Mr Germann, 'Mr Germann, there's going to be a boom at Christmas. Let's get lots of atoms, store them away and make a killing.'

So they collected lots and lots of Uranium atoms, gave them to Mr Goat to keep in the garden shed, and it was just as Mr Hurry predicted. They all went

Ollie who knew about sick animals. Mr Ollie told Mr Goat he should really have eaten apples and not acorns.

Moral: an apple a day keeps Ollie, vetti, away.

Image man spitting mad

PETE Ryvita, image-conscious, yoga-young ideas man at Acorn's video arm, threw a wobbler when his car was broken into just before a computer show earlier in the year.

But what really made him spit was that the only working model of the ABC-based video computer was stolen. The AVC900, as it is called, disappeared from his car never to be seen again.

Jacuzzi on wheels

FOLLOWING his immensely successful C5 electronic bathtub we hear that Uncle Clive is testing the C15 electronic jacuzzi.

Chief test driver Paul Bond, younger brother of James, world famous for vehicular bathing beauty excess, commented: 'We can already get it up to 5mph without changing the water. Things look good for a summer launch. We might even change the name to Zeel5.'

Uncle Clive on Z-cars?

Orson in decline

IN ITS search for a new chief executive we can exclusively reveal that among the candidates was one O Fact. It seems that our Orson was in fact offered the position as chief car crasher but had to decline for financial reasons.

Part of the deal would have been a mammoth share option but unfortunately Orson's independent backing was insufficiently large to cover the possibility of the shares dropping in price.

Buy-out rumour

RUMOURS that *Acorn User* had been bought out by Italian publishers Mamma Mia Magazines were described as 'premature' by Chris Curry's maternity spokeswoman today.

'It's not true! Da editor Antonio di Queeni is Ingles as da Royal Family!' she retorted.

The Milan stock exchange closed six points up.

Contract contact

DEAR, oh dear, more companies being tiresome about the BBC contract. Apple want a bite and Foster's lot are in on the ACT. Next it'll be Seiko with their fancy watches.

ACORN ABUSER'S

Diary



BOOM!

and they sure made a killing.

Who should walk by than Sig di Spaghetti. Now Sig di Spaghetti was very astute and, taking advice from Mr Squirrel, decided to invest in acorns and keep them for a rainy day.

So he gathered up all the electrons that had fallen off the atoms and made his own Piol. Then he took Mr Goat, who had suffered from fallout, to see Mr

Cocky Clive gets his comeuppance in the canteen

WE WARNED Uncle Clive. It had to end. He was getting far too cocky - throwing his weight about all the time. Armageddon took place last Tuesday.

We all went to lunch as usual, but he seemed strangely pettish. A slight disagreement with one of the canteen ladies regarding the exact number of beans to which he was entitled with his egg and chips, and that

was it. He challenged her to a fisticuffs session behind the kitchens.

Well, she was only small, but what a mover! Whatever he tried, she had the counter.

Despite encouragement from his closest aides - 'Stick one on 'er, champ' and 'Lay the nut across 'er, Clivey baby' - he was soon reduced to a bloodstained heap.

She obviously had one like him at home.

We borrowed a tray trolley and wheeled him back to the office for repairs, but he's a broken reed now, sulking behind locked doors writing grumpy poison-pen letters to Heinz.

She, on the other hand, is quite unbearable with her cries of 'Ah whupped him good' and her Ali shuffle. Still, at least we can remove our motorcycle helmets and sticking plaster now.

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